PROJECT SPECIFICATIONS - 100% SUBMITTAL

PIONEER VALLEY TRANSIT AUTHORITY
PARATRANSIT VEHICLE CHARGER PROJECT

2840 Main Street
Springfield, MA 01107

June 2026

IFB #26-106

STV Project #3023168

DOCUMENT 000110

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DIVISION 26 – ELECTRICAL

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DOCUMENT 001113 - ADVERTISEMENT FOR BIDS

1.1 PROJECT INFORMATION

A. Notice to Bidders: Qualified bidders may submit bids for project as described in this Document. Submit bids according to the Instructions to Bidders.

1. Regulatory Requirements: M.G.L. c. 149 shall govern submittal, opening, and award of bids.

B. Project Identification: PVTA Paratransit Vehicle Charging Project, Bid # 26-016.

1. Project Locations:
   a. 2840 Main Street, Springfield, MA 01107

C. Owner: Pioneer Valley Transit Authority (PVTA), 2808 Main Street, Springfield, MA 01107

1. Owner's Representative: John Burke.
2. Procurement Officer: Sandra Sheehan

D. Architect: STV Incorporated

E. Project Description: Project consists of a new level 2 electric vehicle chargers being installed on the exterior of the PVTA Paratransit Storage Facility. The power to the chargers is being supplied from existing electrical equipment in the adjacent maintenance and operations facility approximately 150 feet from the new charger location.

There is an add alternate for the inclusion of two additional dual port chargers on the north side of the bus wash way, including all required wire, conduits, mounting and pavement striping to support parking and charging of 4 additional paratransit vans.

This project also includes unit prices for concrete paving repair.

Cost Estimate:

Base Scope of Work: $406,290

Add/Alt 1 - $153,900

F. Construction Contract: Bids will be received for the following Work:

1. Electrical

G. This project is being bid to Electrical Contractors as the prime contractor to perform all work in the drawings and specifications for the project including site civil work.

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. Electrical Bid:
   a. Bid Date: 07/15/2026.
   b. Bid Time: 11:00, local time.
   c. Location: PVTA, 2808 Main Street, Springfield, MA 01107.

B. Bids will be thereafter, on 07/15/2026 publicly opened and read aloud.

C. Bidder Questions must be received by email before 07/03/26, 5:00pm to ssheehan@pvta.com.

1.3 BID SECURITY

A. Bid security for Electrical Bid in the form of a bid bond, cash, certified check, treasurer's or cashier's check payable to the Owner shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 60 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

1.4 PREBID MEETING

A. Prebid Meeting: A Prebid meeting for all bidders will be held on 6/30/2026, 1:00pm at:
   1. Project Location
      a. 2840 Main Street, Springfield, MA 01107

   2. Prospective bidders are requested to attend.

1.5 DOCUMENTS

A. Online Procurement and Contracting Documents: Obtain access after 6/16/2026, by visiting PVTA's Business Opportunities website: http://www.pvta.com/opportunities.php.

1.6 TIME OF COMPLETION

A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time of 140 days. All work shall be substantially complete in 120 days from Notice to Proceed.

1.7 PERMITS

A. Each bidder shall include in their proposal all costs for permits as may be required for their portion of the work. The Building Permit will be obtained and paid for by the General Contractor.

1.8 BIDDER'S QUALIFICATIONS

A. Bidders must submit a Division of Capital Asset Management approved Certificate of Eligibility and Update Statement pursuant to the requirements of M.G.L. c.149, §44D

B. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work.

C. A Performance Bond, separate Labor and Material Payment Bond in the amount at least equal to one hundred percent (100%), and Insurance in a form acceptable to Owner will be required of the successful Bidder.

D. All bids for this project are subject to applicable bidding laws of Massachusetts, including General Laws Chapter 149 as amended. The project will require filed sub-bids.

E. Prevailing Wage Rates as determined by the Commissioner of the Division of Occupational Safety of the Executive Office of Labor and Workforce Development under the provisions of the Massachusetts General Laws Chapter 149, Section 26 to 27D, as amended, apply to this project.

1.9 NOTIFICATION

A. This Advertisement for Bids document is issued by Pioneer Valley Transit Authority.

B. The contract will be awarded to the bidder deemed by the awarding authority to be the lowest responsible and eligible bidder.

C. The Owner reserves the right to waive any informalities, to accept or reject, in whole or in part any or all bids, or take whatever other action may be deemed to be in the best interest of the Owner.

END OF DOCUMENT 001113

AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

PVTA Paratransit Vehicle Charger Project
2840 Main Steet, Springfield, MA 01107

THE OWNER:
(Name, legal status, address, and other information)

Pioneer Valley Transit Authority
2808 Main St
Springfield, MA 01107

THE ARCHITECT:
(Name, legal status, address, and other information)

STV Incorporated
One Financial Center
Boston, MA 02210

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

See 001113 – Advertisement for Bids

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect by the date listed in the Advertisement for Bids..
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

« » Submit by Email to ssheehan@pvta.com.

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

By Email and posted on the PVTA website.

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than seven days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

See 001113 – Advertisement for Bids

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall

affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning 60 days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids
§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

See 001113 – Advertisement for Bids

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid
§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS
§ 5.1 Opening of Bids
If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids
Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)
§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by

law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder.

DOCUMENT 002113 - INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements. A copy of AIA Document A701, "Instructions to Bidders," is bound herein and immediately follows this page.

END OF DOCUMENT 002113

APPENDIX 002113 – PVTA PROTEST PROCEDURES

1.1 GENERAL

1.2 This procedure is applicable to all procurements in excess of $100,000. Protests for procurements of less than $100,000 shall be informally handled by the Procurement Department.

2.1 DEFINITIONS

2.2 "Interested Party" means an actual or prospective bidder or offeror whose direct economic interest would be affected by the award of a contract or by the failure to award a contract. It does not include subcontractors or potential subcontractors.

2.3 All "days" referred to are deemed to be normal business days. Except as otherwise provided, in computing a period of time prescribed by these regulations, the day from which the designated period of time begins to run shall not be counted, but the last day of the period shall be counted unless that day is not a normal business day, in which event the period shall include the next working day. Time for filing any document or copy thereof with the Authority expires at 4:30 p.m. Eastern Standard Time or Eastern Daylight Savings Time, as applicable on the last day on which such filing may be made.

2.4 "Adverse agency action" is any action or inaction on the part of the Authority which is prejudicial to the position taken in a protest filed with the Authority. It may include but is not limited to: a decision on the merits of a protest; a procurement action such as the opening of bids or receipt of proposals, the award of a contract, or the rejection of a bid despite the pendency of a protest; or the Authority acquiescence in and active support of continued and substantial contract performance.

3.1 FILING OF PROTEST

3.2 An interested party may protest to the Authority a solicitation issued by the Authority for the procurement of property or services, or the proposed award or the award of such a contract.

3.3 Protest must be in writing and addressed as follows: Sandra Sheehan, Procurement Officer, PVTA, 2808 Main Street, Springfield, MA 01107.

3.4 The protester shall furnish two complete copies of the protest to the Procurement Officer, addressed as stated above.

3.5 A protest filed with the Authority shall:

1. Include the name, address and telephone number of the protester;
2. Include an original signed by the protester or its representative;
3. Identify the solicitation and purchase order number;
4. Set forth a detailed statement of the legal and factual grounds of protest, including copies of relevant documents; and,
5. State the form of relief requested.

3.6 No formal briefs or other technical forms of pleading or motion are required. Protest submissions should be concise, logically arranged, and clearly state legally sufficient grounds of protest.

3.7 A protest filed with the Authority may be dismissed for failure to comply with any of the requirements of this section.

4.1 TIME OF FILING

4.2 Protests based upon alleged improprieties in a solicitation which are apparent prior to bid opening or the closing date for receipt of initial proposals shall be filed prior to bid opening or the closing date for receipt of initial proposals. In procurements where proposals are requested, alleged improprieties which do not exist in the initial solicitation, but which are subsequently incorporated into the solicitation, must be protested not later than the next closing date for receipt of proposals following the incorporation.

4.1.1 In cases other than those covered above, protests shall be filed not later than 5 days after the basis of protest is known or should have been known, while within 5 days prior to the date specified for a bid opening of an IFB or for the due date for filing a response for RFP's.

4.3 The term "filed" regarding protests to PVTA means receipt of the protest submission in PVTA's Procurement Department.

4.4 PVTA, for good cause shown, or where it determines that a protest raises issues significant to the procurement system, may consider any protest which is not filed timely.

5.1 NOTICE OF PROTEST, SUBMISSION OF AUTHORITY REPORT AND TIME FOR FILING OF COMMENTS ON REPORT

5.2 The Procurement Officer shall promptly give notice of the protest to the contractor if award has been made or, if no award has been made, to all bidders or offerors who appear to have a substantial and reasonable prospect of receiving an award if the protest is denied. The Procurement Officer shall furnish copies of the protest submissions to such parties, if requested to do so in writing. In addition, if a contract will be paid in part with funding from the FTA, then the FTA Region I office shall be notified in writing of the protest.

5.3 Material submitted by a protester will not be withheld from any interested party outside the Authority which may be involved in the protest except to the extent that the withholding of information is permitted or required by law or regulation. If the protester considers that the protest contains material which should be withheld, a statement advising of this fact must be affixed to the front page of the protest submission and the allegedly protected information must be so identified whenever it appears.

5.4 Protests shall be reviewed by a panel consisting of representatives of Legal, the Procurement Officer and appropriate technical and other staff. Such review panel shall be chaired by the Procurement Officer or by a designee, as authorized in writing.

Documents that will be included in the review will consist of the protest, the bid or proposal submitted by the protester, the solicitation, including the specifications or portions relevant to the protest, the abstract of bids or offers or relevant portions, any other documents that are

relevant to the protest, or any additional evidence or information deemed necessary in determining the validity of the protest. Following final review, the Procurement Officer will furnish a copy of the report to the protester and interested parties who have responded to the notice.

5.5 Comments on the report shall be filed by the protester and interested parties with the Procurement Officer within 5 days after receipt of the report. Failure of the protester to file comments, or to file a statement requesting that the case be decided on the existing record, or to request an extension under this section within the 5-day period will result in dismissal of the protest.

5.6 Notwithstanding any other provision of this procedure, when on its face a protest does not state a valid basis for protest or is untimely, the Procurement Officer may summarily dismiss the protest. Among the protests which may be dismissed without consideration of the merits are those concerning the following:

1. PVTA's Purchasing Regulations and Procedures.
2. Contract Administration.
3. Affirmative Determination of Responsibility by the Procurement Officer. Because the determination that a bidder or offeror is capable of performing a contract is based in large measure on subjective judgments which generally are not readily susceptible of reasoned review, an affirmative determination of responsibility will not be reviewed, absent a showing that such determination was made fraudulently or in bad faith or that definitive responsibility crite1ia in the solicitation were not met.
4. Determinations by the Authority of "minor informalities" in bids or proposals which can be waived by the Authority, absent a showing that such determination was made fraudulently or in bad faith or that definitive responsiveness criteria in the solicitation were not met.
5. Affirmative determination by the Authority that a bid or proposal is responsive to the Authority's specifications, absent a showing that such determination was made fraudulently or in bad faith or that definitive specification criteria in the solicitation were not met.
6. Protests not filed within the time limits set forth above.
7. Subcontractor Protests. The Authority will not consider subcontractor protests.
8. Judicial proceedings. The Authority will not consider protests where the matter involved is the subject of litigation before a court of competent jurisdiction, unless the court requests a decision by the Authority in accordance with these procedures. The Authority will not consider protests where the matter involved has been decided on the merits by a court of competent jurisdiction.

6.1 WITHHOLDING OF AWARD AND SUSPENSION OF CONTRACT PERFORMANCE

6.2 When the Authority receives notice of a protest prior to award of a contract it may not award a contract under the protested procurement while the protest is pending unless the Procurement Officer determines in writing that urgent and compelling circumstances significantly affecting interests of PVTA will not permit waiting for the protest decision.

7.1 CONFERENCE MEETING

7.1 A conference meeting on the merits of the protest may, at the sole discretion of the review panel, be held at the request of the protester or interested parties who have responded to the notice given above. Requests for a conference should be made at the earliest possible time in the protest proceeding.

7.2 Conferences will be held on a date set by the review panel no later than 5 days after receipt by the protester and interested parties of the review panel report. All interested parties shall be invited to attend. Ordinarily, only one conference will be held on a protest.

7.3 If any party refuses to attend such a conference, or a witness fails to attend or fails to answer a relevant question, the review panel may draw an inference unfavorable to the party refusing to cooperate.

7.4 The review panel may request that a conference be held if at any time during the protest proceeding it decides that such a conference is needed to clarify material issues. If such a conference is held the review panel shall make such adjustments in the submission deadlines as it determines to be fair to all parties.

7.5 Failure of the protester to file comments, or to file a statement requesting that the case be decided on the existing record will result in dismissal of the protest.

8.1 REMEDIES

8.2 If the review panel determines that a solicitation or proposed award does not comply with statute or regulation, it shall recommend that the Authority implement any combination of the following remedies which it deems appropriate under the circumstances:

1. Refrain from exercising options under the contract;
2. Recomplete the contract;
3. Issue a new solicitation;
4. Award a contract consistent with statute and regulation; or
5. Such other recommendations as the Procurement Officer determines necessary to promote compliance.

8.3 In determining the appropriate recommendation, the review panel shall consider all the circumstances surrounding the procurement or proposed procurement including, but not limited to, the seriousness of the procurement deficiency, the degree of prejudice to other interested parties or to the integrity of the competitive procurement system, the good faith of the parties, the extent of performance, cost to the Authority, the urgency of the procurement and the impact of the recommendation on the Authority's mission.

9.1 TIME FOR DECISION BY THE AUTHORITY'S REVIEW PANEL

9.2 The review panel shall issue a final decision on a protest within 60 days from the date the protest is filed with it. The determination of PVTA regarding a protest will be final.

10.1 FTA INVOLVEMENT

10.2 FTA Circular 4220.l F provides the following advice regarding appeals from the Authority's determination:

> ...A protester must exhaust all administrative remedies with the grantee (Authority) before pursuing a protest with FTA. Review of protests by FTA will be limited to a grantee's failure to have or follow its protest procedures, or its failure to review a complaint or protest. An appeal to the FTA must be received by the cognizant FTA regional or Headquarters Office within five (5) working days of the date the protestor knew or should have known of the violation.
>
> Violations of Federal law or regulation will be handled by the complaint process stated in that law or regulation. Violations of State or local law or regulations will be under the jurisdiction of State or local authorities.

END OF APPENDIX 002113A

DOCUMENT 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1. AIA Document A701, "Instructions to Bidders" a copy of which is bound in this Project Manual.
2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

A. The following supplements modify AIA Document A701, "Instructions to Bidders." Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, unaltered portions of the Instructions to Bidders shall remain in effect.

1.3 ARTICLE 2 - BIDDER'S REPRESENTATIONS

A. Add Section 2.1.3.1:

1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

B. Add Section 2.1.5:

1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of the Commonwealth of Massachusetts and meets qualifications indicated in the Procurement and Contracting Documents.

C. Add Section 2.1.6:

1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.4 ARTICLE 3 - BIDDING DOCUMENTS

A. 3.1 – Copies

1. Delete Section 3.1.1 and insert the following:

a. Qualified Bidders may obtain complete electronic sets of the Bidding Documents from PVTA's Business Opportunities website: http://www.pvta.com/opportunities.php.

2. Delete Section 3.1.2.

B. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:

1. Add Section 3.2.2.1:

a. 3.2.2.1 - Submit Bidder's Requests for Interpretation using form bound in the Project Manual.
b. Delete Section 3.2.2 and insert the following:

1) Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach PVTA's Procurement Director at ssheehan@pvta.com by , February 24th, 2022 at 5:00pm.

C. 3.4 - Addenda:

1. Delete Section 3.4.3 and replace with the following:

a. 3.4.3 - Addenda will be issued on or before March 3rd, 2022 except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

2. Add Section 3.4.4.1:

a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:

1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.5 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.1.1:

a. 4.1.1.1 - Printable electronic Bid Forms and related documents are available from the PVTA.

2. Add Section 4.1.8:

a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

3. Add Section 4.1.9:

a. 4.1.9 - Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

B. 4.3 - Submission of Bids:

1. Add Section 4.3.1.2:

a. 4.3.1.2 - Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

a. 4.4.2.1 - Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.

b. 4.4.2.2 - Owner will consider modifications to a bid written on the sealed bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.

1.6 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Delete Section 6.1.1:

B. 6.3 - Submittals:

1. Add Section 6.3.1.4:

a. 6.3.1.4 - Submit information requested in Sections 6.3.1.1, 6.3.1.2, and 6.3.1.3 no later than **two** business days following Architect's request.

1.7 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

a. 7.1.1.1 - Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

B. 7.2 - Time of Delivery and Form of Bonds:

1. Delete the first sentence of Section 7.2.1 and insert the following:

a. The Bidder shall deliver the required bonds to Owner no later than **5** days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

a. 7.2.3 - Bonds shall be executed and be in force on the date of the execution of the Contract.

1.8 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. A101-2017 edited as bound in this Project Manual.

1.9 ARTICLE 9 - EXECUTION OF THE CONTRACT

A. Add Article 9:

1. 9.1.1 - Subsequent to the Notice of Intent to Award, and within **5** days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner.
2. 9.1.2 - Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed.
3. 9.1.3 - Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement **or the date that the Bidder is obligated to deliver the executed Agreement and required bonds to Owner**.
4. 9.1.4 - In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

1.10 ARTICLE 10 TIME FOR COMPLETION

A. Add Article 10:
   1. Substantial Completion: The date for Substantial Completion shall be 120 calendar days from Notice to Proceed.
   2. Final Completion: The date for Final Completion shall be 140 calendar days after the date of Substantial Completion.

END OF DOCUMENT 002213

DOCUMENT 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award.

1.2 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than **10** days prior to date of bid opening.
2. Submittal Format: Submit three copies of each written Procurement Substitution Request, using form immediately following this section.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

SUBSTITUTION REQUEST FORM

PROJECT: PVTA Paratransit Vehicle Charging

OWNER: Pioneer Valley Transit Authority

TO	Architect/Engineer	FROM	Contractor

Steven Packard
STV Incorporated

Steven.packard@stvinc.com

CONTRACTOR'S REQUEST, WITH SUPPORTING DATA

1. Specification Sections to which this request applies:

☐ Product data for proposed substitution is attached (description product, reference standards, performance and test data).

☐ Sample is attached ☐ Sample will be sent if required by Architect

2. Itemized comparison of proposed substitution with product specified.

	SPECIFIED PRODUCT	PROPOSED SUBSTITUTION
Name, brand		
Catalog No.		
Manufacturer:		
Significant Variations		

3. Proposed change in Contract Time:

☐ _____ ☐

☐ Reduce/Increase Contract Time by _____ days. ☐ No change.

4. Proposed Change in Contract Sum:

   Credit to Owner $_____ Addition Cost to Owner $_____.

5. Effect of the proposed substitution on other parts of the Work, or on other contracts.

_____

_____

CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

We have investigated the proposed equivalent material and we:

1. believe that it is equal or superior in all respects to the originally specified product, except as stated in 2. above;
2. will provide the same warranty as required in Division 1 Section "Warranties";
3. will provide the same special warranty or guaranty as specified;
4. will pay redesign and special inspection costs caused by the use of this product;
5. will pay additional costs to other contractors caused by the substitution;
6. will coordinate the incorporation of the proposed substitution in the Work;
7. will modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning;
8. waive future claims for added cost to Contractor caused by the proposed substitution;
9. confirm that this product is compliant with the Buy America Requirements as specified; and

Contractor Signature (s) _____ Date _____

ARCHITECT'S REVIEW AND ACTION

☐ Provide more information in the following categories. Resubmit.

☐ Sign Contractor's Statement of Conformance. Resubmit.

☐ The proposed substitution is approved, with the following conditions

_____

_____

Addition/Deduction from the Contract Time: _____ days.

Addition/Deduction from the Contract Amount: _____ dollars.

☐ The proposed Substitution is rejected for the following reason (s):

_____

_____

DOCUMENT 004100 - BID FORM – GENERAL CONTRACT

Bid of _____ (hereinafter called "Bidder")*

100% SUBMITTAL
(____) a corporation, organized and existing under the laws of the state of _____

(____) a partnership

(____) a joint venture

(____) an individual

doing business as _____

To the Pioneer Valley Transit Authority (hereinafter called "Owner").

A) The undersigned Bidder, in compliance with your invitation for bids for the project known as _____, having examined the plans and specifications and related documents and the site of the proposed work, having had the opportunity to visit the site, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents and the plans and specifications within the time set forth below, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this bid is a part.

The Bidder hereby agrees to commence work on or before the date to be specified in written "Notice to Proceed" of the Owner, and to substantially complete the project within 112 consecutive calendar days thereafter.

_____
*Specify corporation, partnership or individual as applicable.

B) Bidder acknowledges receipt of and this bid includes the following addenda:

No. _____ Dated:

No. _____ Dated:

No. _____ Dated:

No. _____ Dated:

C) The Bidder agrees to perform the work described in the specifications and shown on the plans for the following contract price:

SCHEDULE OF BID PRICES

THE SCHEDULE OF THE BASE ESTIMATED CONTRACT BID PRICES IS AS FOLLOWS:

Item No.	Description	Bid Price In Words	Bid Price In Numbers
	Total Base Bid		

THE SCHEDULE OF THE **ADD ALTERNATE 1** ESTIMATED CONTRACT BID PRICES IS AS FOLLOWS

Item No.	Description	Quantity and Unit	Bid Price In Words	Bid Price In Numbers
1	Additional Dual Port Chargers (Add #1)	1 Lump Sum		

BASE BID UNIT PRICES

ITEM	SPECIFICATION SECTION	ESTIMATED QUANTITY (BEYOND DRAWINGS)	UNIT OF MEASURE	UNIT PRICE DOLLAR AMOUNT	TOTAL DOLLAR AMOUNT
CONCRETE PAVING REPAIR	033000		SQUARE FOOT	$	$

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; 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; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

The Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids.

Bid security is attached in the sum of five percent (5%) of the total bid in accordance with the conditions of Section 002113 INSTRUCTIONS TO BIDDERS. The bid security may become the property of the Owner in the event the contract and bonds are not executed within the time set forth above.

The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications.

1. Have been in business under present name for ____ years.

2. The names and addresses of all persons interested in the bid (if made by a partnership or corporation) as principals, are as follows:

_____

_____

_____

_____

_____

_____

(attach supplementary list if necessary)

3. The bidder is requested to state below what work of a similar character to that included in the proposed contract he has done, and give references that will enable the Owner to judge his experience, skill and business standing (add supplementary page if necessary).

Completion Date	Project Name	Contract Amount	Design Architect	Reference Name	Telephone No.

Pursuant to M.G.L. C. 62C, Sec. 49A, I certify hereby in writing, under penalties of perjury, that the within named Bidder/Contractor has complied with all laws of the commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting of child support.

The undersigned bidder hereby certifies, under pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less that the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development. The undersigned bidder agrees to indemnify the Awarding Authority for, from and against any loss, expense, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates or (2) the failure of the bidder, if selected as the contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

Respectfully submitted:

Date: _____ By: _____
(Signature)

_____
(Type Name of Bidder)

_____
(Title)

_____
(Business Address)

_____
(City and State)

_____
(Telephone Number)

END OF DOCUMENT 004100

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor
where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Pioneer Valley Transit Authority
2808 Main St
Springfield, MA 01107

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

PVTA Paratransit Vehicle Charger Project
2840 Main Street, Springfield, MA 01107

The Architect:
(Name, legal status, address and other information)

STV Incorporated
One Financial Center
Boston, MA 02210

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[«X»] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than «120» («one hundred twenty») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2007, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » (« »). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » (« »);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.6.2 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.7 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.6.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« X»] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2007, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

§ 8.6 Notice in electronic format, pursuant to Section 13.3 of AIA Document A201–2007, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 **.3** AIA Document A201™–2007, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2007 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____
(Name of Contractor)

a _____ hereinafter called "Principal" and
(Corporation, Partnership, Joint Venture or Individual)

_____of _____, State of _____
(Surety) (City & State)

_____ hereinafter called the "Surety" and licensed by the State Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to _____, hereinafter called "Owner", in the penal sum of
_____ Dollars
($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20___ (the "Construction Contract"), for the construction described as follows: _____
_____.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of the Construction Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under the Construction Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the Surety's obligation under this Bond shall arise after (1) the Owner has declared the Principal in default of the Construction Contract or any provision thereof or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to execute the work consistent with, and in conformance to, the Construction Contract (collectively referred to as a "Contractor Default"). The determination of a Contractor Default shall be made solely by the Owner. The Owner need not terminate the Construction Contract to declare a Contractor Default or to invoke its rights under this Bond.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall promptly take one of the following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract: (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the Owner in performing and completing the work of the Construction Contract. Surety will keep Owner reasonably informed of the progress, status and results of any investigation of any claim of the Owner.

If the Surety does not proceed as provided in this Bond with due diligence and all deliberate speed, the Surety shall be deemed to be in default of this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.

After the Surety's obligation under this Bond arises, the Surety is obligated, to the limit of the amounts of this Bond, for (1) the correction of defective work and completion of the Construction Contract; (2) additional design, professional services, and legal costs, including attorneys' fees, resulting from the Contractor Default or from the default of the Surety under this Bond; (3) any additional work beyond the Construction Contract made necessary by the Contractor Default or default of the Surety under this Bond; (4) indemnification obligation of the Principal, if any, as provided in the Construction Contract; and (5) liquidated damages as provided in the Construction Contract, or if none are so specified, actual and foreseeable consequential damages resulting from the Contractor Default or default of the Surety under this Bond.

Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction in the Commonwealth of Massachusetts.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Contract or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument is executed in _____ ( ) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20___.

ATTEST:

_____
Principal

_____ By _____
(Principal Secretary)

_____

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

_____

_____
(Address-Zip Code)

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ a_____ _____
(Name of Contractor) (Corporation, Partnership, Joint Venture or Individual)

hereinafter called "Principal" and _____ of _____,
(Surety)

State of _____ hereinafter called the "Surety" and licensed by the State
(City and State)

Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to _____, hereinafter called "Owner", in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20___, for the construction described as follows:

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____ ( ) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

DOCUMENT 007000 – GENERAL CONDITIONS

1.1 GENERAL CONDITIONS

A. AIA Document A201, "General Conditions of the Contract for Construction," and “Supplementary Conditions” are hereby incorporated into the Procurement and Contracting Requirements. A copy of AIA Document A201, " General Conditions of the Contract for Construction” and “Supplementary Conditions” are bound herein immediately following this page.

END OF DOCUMENT 007000

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

PVTA Paratransit Vehicle Charger Project
2840 Main Street, Springfield, MA 01107

THE OWNER:
(Name, legal status and address)

Pioneer Valley Transit Authority
2808 Main St
Springfield, MA 01107

THE ARCHITECT:
(Name, legal status and address)

STV Incorporated
One Financial Center
Boston, MA 02210

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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INDEX

(Topics and numbers in bold are Section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set

forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately

suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design 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 the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not

have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will

similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the

Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor

change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot

be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.6 Disadvantaged Business Enterprise (DBE)

§ 13.6.1 This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs. The goal for participation of Disadvantaged Business Enterprises (DBE) is 3%.

§ 13.6.2 The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the PVTA deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

The successful bidder/offeror will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.

§ 13.6.3 The contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than 30 days after the contractor's receipt of payment for that work from the PVTA. In addition, the contractor is required to return any retainage payments to those subcontractors within 30 days after the subcontractor's work related to this contract is satisfactorily completed.

§ 13.6.4 The contractor must promptly notify the PVTA, whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of the PVTA.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional

days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work

properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY CONDITIONS

The following Supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction," AIA Document A201, 2007 Edition. Where any Article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, paragraph, subparagraph or clause shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

PARAGRAPH 1.1 BASIC DEFINITIONS

A. Sub-paragraph 1.1.1: Line 2, before "Agreement," insert "the Bidding Requirements (Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, Completed Bid Form, Bid Bond, completed Contractor's Qualification Statement, and other sample forms). Delete the last sentence in its entirety.

B. Sub-paragraph 1.1.8: Delete "Claims" and insert "claims". Delete "and certify termination of the Agreement under Section 14.2.2.".

PARAGRAPH 1.2

A. Sub-paragraph 1.2.1: Add to the end of the sub-section:

All Work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others. Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of Work unless otherwise directed by written addendum to the Contract.

B. Sub-paragraph 1.2.2: Add to the end of the sentence:

, except that the performance of filed sub-trade work shall comply with the provisions of chapter 149 of the General Laws of the Commonwealth of Massachusetts. The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the Work of the mechanical, electrical and other specialized trades, and to all of the Sections of the Specifications, and shall perform all Work reasonably inferable therefrom as being necessary to produce the indicated results.

C. Sub-paragraphs 1.2.4-1.2.11: Add the following new sub-sections 1.2.4 to 1.2.11 as follows:
-1.2.11

§ 1.2.4 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

§ 1.2.5 Where codes, standards, requirements, and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated.

§ 1.2.6 Where no explicit quality or standards for materials or workmanship are established for Work,

such Work is to be of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

§ 1.2.7 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

§ 1.2.8 The Electrical drawings are diagrammatic only, and are not intended to show the alignment, physical locations or configurations of such Work. Such Work shall be installed without additional cost to the Owner to clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. Prior to beginning such Work, the Contractor shall prepare coordination drawings showing the exact alignment, physical location and configuration of the Electrical installations and demonstrating to the Contractor's satisfaction that the installations will comply with the preceding sentence. A copy of the drawings shall be submitted to the Architect, and the Contractor shall revise and resubmit the drawings if so directed by the Architect.

§ 1.2.9 Exact locations of fixtures and outlets shall be obtained from the Architect as provided in subparagraph 3.2.5 before the Work is roughed in; Work installed without such information from the Architect shall be relocated at the Contractor's expense.

§ 1.2.10 Test boring or soil test information included with the Contract Documents or otherwise made available to the Contractor was obtained by the Owner for use by the Architects in the design of the Project or Work. The Owner does not hold out such information to the Contractor as a completely accurate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the Contractor on such information shall be allowed except as provided in subparagraph 3.7.4.

§ 1.2.11 Where the Work is to fit with existing conditions or work to be performed by others, the Contractor shall fully and completely join the Work with such conditions or work, unless otherwise specified. Owner provided drawings showing existing conditions or construction are based on available documents and are not guaranteed to show actual existing conditions.

PARAGRAPH 1.5

A. Sub-paragraph 1.5.1: Delete 1.5.1 and replace as follows:

§ 1.5.1 All Drawings, Specifications and copies thereof furnished by the Owner are and shall remain the Owner's property. They are to be used only with respect to this Project and are not to be used on any other project without the prior written consent of the Owner. With the exception of one contract set for each party to the Contract, such documents are to be returned or suitably accounted for to the Owner at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of any reserved rights.

ARTICLE 2 OWNER

PARAGRAPH 2.1

A. Delete Sub-Paragraph 2.1.2

PARAGRAPH 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

A. Sub-Paragraph 2.2.1: Delete the last three sentences.

B. Sub-Paragraph 2.2.2: Add the following to the beginning of the paragraph:

"If required by the nature of the Work,"

C. Sub-Paragraph 2.2.3: In the first sentence insert "available" after "shall furnish". Delete the last sentence and replace as follows:

The Owner makes no warranty as to the accuracy or completeness of such information, and the Contractor shall exercise proper precautions relating to the safe performance of the Work.

D. Sub-Paragraph 2.2.4: Delete the last sentence.

E. Sub-Paragraph 2.2.5: Add to the end of the sub-section as follows:

All additional copies will be furnished upon request at the cost of reproduction.

PARAGRPAH 2.3

a. Sub-Paragraph 2.3 Delete from the last sentence ", except to the extent required by Section 6.1.3" and add as follows:

The Contractor shall resume the Work after such stoppage promptly upon written notice to do so from the Owner. The Contractor shall remain responsible for maintaining the progress of the Work and shall not be entitled to any increase in the Contract Sum or Contract Time. The Contractor shall be responsible for all costs incurred by the Owner attributable to such an order to stop the Work.

ARTICLE 3 CONTRACTOR

PARAGRAPH 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

A. Subparagraph 3.2.1: Delete "generally" after "the site, become". Add to the end of the sub-section as follows:

The Contractor shall not be entitled to any change in the Contract Time or Contract Sum on account of its failure, or that of any Subcontractor, to comply with the foregoing requirements.

B. Subparagraph 3.2.2: Delete the beginning of the second sentence through the words "in the Contract documents; however". Add the following at the end of the subparagraph:
"If the Contractor fails to make such report, no excuse will thereafter be entertained by Owner or Architect for failure to carry out the work in satisfactory manner. Should conflict occur within or between Contract Documents, the Contractor is deemed to have estimated on more expensive way of doing work, unless the Contractor asked for and obtained written decision before submission of proposal as to which method or materials will be required. Delete the last sentence and replace as follows:

If the Contractor performs any construction activity that it knows or should know involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear responsibility for the costs of any required correction.

C. Subparagraph 3.2.3: Delete "not" after "Contractor is". Delete ", but" after "public authorities" and create new sentence beginning with "The Contractor shall promptly".

D. Subparagraph 3.2.4: Delete "claims" after "the Contractor shall make" and insert "a claim". Delete the last sentence.

E. Subparagraph 3.2.5: Add new sub-section 3.2.5 as follows:

§ 3.2.5 Any claim by the Contractor or Subcontractors that, in submitting their respective bids, they did not include all items as shown in the Contract Documents will be given no consideration for an adjustment of any kind. If any item is specified in a Section which would not normally furnish this item it shall be the responsibility of the Contractor to coordinate the situation with the Subcontractor, and if the item under consideration is not to be provided by the Subcontractor it shall be the responsibility of the Contractor to provide the work in question, without any additional cost to the Owner.__

PARAGRAPH 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

A. Subparagraph 3.3.1: Add to the end of the first sentence as follows:

which shall not be less than such state of skill and attention generally rendered by the contracting profession for projects similar to the Project in scope, difficulty and location. The Contractor shall adequately staff the Project to properly and thoroughly manage, schedule and supervise all construction activities.

Delete the last sentence.

B. Subparagraph 3.3.2: After "performing" insert "any." Add the last sentence as follows:

This obligation shall also extend to the presence on the Site of suppliers of materials or equipment, their employees, contractors, and agents engaged in the Work.

PARAGRAPH 3.4 LABOR AND MATERIALS

A. Subparagraph 3.4.2: Delete in its entirety and substitute the following:

"3.4.2 The Contractor may propose substitutions in accordance with the requirements for substitutions in Division 1 Specifications."

B. Subparagraph 3.4.3: Add to the end of the second sentence as follows:

, and the Contractor shall ensure that all workers to be employed on the Project have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) of at least 10 hours. The Contractor shall be responsible for maintaining all safety precautions at and around the Project site. On the Owner's request, the Contractor shall permanently remove from the Project site any employee of the Contractor or any Subcontractor

who fails to comply with the requirements of the Contract Documents or whose presence or behavior is deemed by the Owner to be adverse to the success of the Project or the Owner's interests.

PARAGRPAH 3.5

A. Add to the end of the first sentence as follows:

and, promptly after written notification of non-conformance, shall be repaired or replaced by the Contractor with Work conforming to such requirements.

Delete the second to last sentence.

B. Add new subparagraphs 3.5.2 to 3.5.8 as follows:

§ 3.5.2 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense. This provision shall not require the Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.

§ 3.5.3 If the Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval and request approval of the deviation. The Architect shall judge the design and appearance of proposed substitutes, an may refuse to approve any substitute which, in the Architect's opinion, would be out of character or otherwise inconsistent with the character or quality of design of the Project.

§ 3.5.4 In informing the Architect of deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable in accordance with the Contract Documents. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

§ 3.5.5 Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.

§ 3.5.6 The warranty provided in this paragraph 3.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

§ 3.5.7 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranty will be performed in accordance with its terms and conditions.

§3.5.8 The Contractor shall guarantee all Work for a period of one year after Date of Substantial Completion, or by the terms of any special guarantee required by the Contract Documents. The Contractor shall, upon written notice from the Owner, promptly correct defective Work or Work not in accordance with the Contract Documents. __

PARAGRAPH 3.6 TAXES

A. Delete in its entirety and substitute the following:

"3.6.1.1 The project is exempt from the Massachusetts Sales Tax to the extent permitted by G.L. c.64H, §6(f). The exemption number will be provided by the Awarding Authority to the Contractor.__ These taxes are not to be included in the Contract Sum.

3.6.1 Exception: Plumbing and Drainage Contractor/Subcontractor to obtain and pay for all necessary connection taxes and other service charges required by local sewer or water authorities to complete plumbing systems."

PARAGRAPH 3.7 PERMITS, FEES AND NOTICES

A. Subparagraph 3.7.2: Add to the end of the sub-section as follows:

If any of the Work is required to be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed and shall comply with any instructions or corrections ordered by the public authority.

B. Subparagraph 3.7.3: Delete "knowing it" after "performs Work" and replace with "it knows or should know".

C. Delete sub-section 3.7.4 and replace as follows:

§ 3.7.4 Concealed or Unknown Conditions. Claims for concealed or unknown conditions shall be governed by Chapter 30, Section 39N of the General Laws of the Commonwealth of Massachusetts, as amended.

D. Subparagraph 3.7.5: Delete second and last sentences.__

PARAGRAPH 3.8

A. Delete this Paragraph in its entirety.

PARAGRAPH 3.9 SUPERINTENDENT

A. Subparagraph 3.9.1: In the first sentence: Insert ", in accordance with the Contract Documents," after "shall employ" and insert "at all times" after "the Project site".

B. Subparagraph 3.9.3: Add the following at the end: "Proposed changes of Superintendents shall follow the same review procedures as in 3.9.2".

C. Add new subparagraphs 3.9.4 and 3.9.5 as follows:

§ 3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of Work and the storage of materials.

§ 3.9.5 The Contractor shall arrange for and attend job meetings with the Architect and such other persons as the Architect may from time to time wish to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be served on such representatives.__

PARAGRAPH 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

A. This paragraph is supplemented by Division 1 Specifications.

PARAGRAPH 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. This paragraph is supplemented by Division 1 Specifications.

PARAGRAPH 3.13

A. Add to the end of the Subparagraph as follows:

The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times with the Owner. The Contractor's right to entry and use thereof arises solely from the permission granted by the Owner under the Contract Documents. The Owner shall not be liable to the Contractor, the Subcontractors, their employees, or anyone else with respect to the conditions of the premises, except only for a condition caused directly and solely by the negligence of the Owner.

PARAGRAPH 3.15 CLEANING UP

A. This paragraph is supplemented by Division 1 Specifications.

PARAGRAPH 3.16

A. Insert “, Owner’s representatives” after “provide the Owner”.

PARAGRAPH 3.18 INDEMNIFICATION

A. Delete subparagraph 3.18.1 and replace with the following:

“3.18.1 To the fullest extent provided by law, and notwithstanding the limits of any insurance provided or maintained by the Contractor, the Contractor shall defend, indemnify, and hold harmless the Owner, Architect, Architect’s Consultants and officers, employees, members and agents of any of them from

and against all claims, actions, liabilities, damages, and costs (including, but not limited to, attorneys fees) of every nature and description arising out of or resulting from the acts, omissions, or negligence of the Contractor or his employees or agents or by anyone directly or indirectly employed by the Contractor, including Subcontractors, or anyone for whose acts the Contractor may be liable. The Contractor's duties and obligations pursuant to this subparagraph shall survive the termination or expiration of this agreement and shall not be limited by any provision herein requiring the Contractor to maintain specific insurance coverages. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations, including those of indemnity, which would otherwise exist as to a party or person described in this section."

ARTICLE 4 ARCHITECT

PARAGRAPH 4.1 GENERAL

A. Subparagraph 4.1.2, First Sentence: Delete "Contractor."

B. Delete subparagraph 4.1.3 in its entirety.

PARAGRAPH 4.2 ADMINISTRATION OF THE CONTRACT

A. Change title of this Paragraph from "Administration of the Contract" to "Services of The Architect."

B. Subparagraph 4.2.1

1. First Sentence: Change "administration of the Contract" to "professional services."

C. Subparagraph 4.2.3: In the first sentence delete "reasonably" after "will keep the Owner."

D. Delete Subparagraph 4.2.10

E. Subparagraph 4.2.11: Add to the end of the sub-section as follows:

The parties agree that the Architect's duties under this subparagraph shall be governed by Chapter 30, Section 39P of the General Laws of the Commonwealth of Massachusetts, as amended.

F. Subparagraph 4.2.12: Delete the second sentence.

ARTICLE 5 SUBCONTRACTORS

A. Subparagraph 5.1.1: Delete the first sentence and substitute the following:

"A Subcontractor is any person or entity who has a direct contract with the Contractor to perform any portion of the Work."

Paragraph 5.2

A. Subparagraph 5.2.2: In the second sentence insert "and legally permissible" after "has made reasonable".

B. Subparagraph 5.2.3: Delete the last two sentences and replace as follows:

No increase in the Contract Sum or Contract Time shall be allowed for such change.

C. Subparagraph 5.2.4: Add to the end of the sub-section as follows:

The applicable provisions of Chapter 149, Section 44F of the General Laws of the Commonwealth of Massachusetts shall apply to filed sub-bid subcontractors.

D. Subparagraph 5.4.1: In sub-heading .1 delete "Section 14.2" and replace with "Article 14".

Add new sub-heading .3 as follows:

.3 The Owner may further assign the subcontract to a successor contractor or other entity.

Delete last sentence of subparagraph.

E. Delete Subparagraphs 5.4.2 and 5.4.3.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

PARAGRAPH 6.1

A. Subparagraph 6.1.1: At the end of the first sentence delete "including those portions related to insurance and waiver of subrogation". In the second sentence delete "Claim" after "shall make such" and replace with "claim".

B. Delete Subparagraph 6.1.4 and replace as follows:

§ 6.1.4 The Owner reserves the right to enter any part of the Project site at any time to inspect the Work or to perform other work with its own forces or separate contractors, or to address any emergency situation. Such access is not to be construed to mean partial occupancy by the Owner and no claim for increase in the Contract Time or Sum will be considered unless such Owner's contractors have delayed or damaged the Contractor's Work. The Contractor shall permit the Owner to place and install as much furniture, equipment and other material during the progress of the Work as is possible before completion of the various parts of the Work and agrees that such placing and installation of equipment shall not in any way evidence the completion or acceptance of the Work or any portion of it.__

PARAGRAPH 6.2 MUTUAL RESPONSIBILITY

A. Subparagraph 6.2.2, Last Sentence: After "Contractor," change "so to" to "to so."

B. Subparagraph 6.2.3: Delete the last sentence.

C. Delete Subparagraph 6.2.5 in its entirety.

PARAGRAPH 6.3 OWNER'S RIGHT TO CLEAN UP

A. Last Line: Delete balance of sentence after "the Owner," and replace with "may elect to complete such clean up with his own forces, or to contract with others for this service, either on a specific occasion, or for the balance of the project. In either event, the Architect shall determine, at his sole discretion, what portion of these costs shall be back charged to each Contractor."

ARTICLE 7 CHANGES IN THE WORK

PARAGRAPH 7.2

A. Add new sub-section 7.2.3 as follows:

§ 7.2.3 Upon request of the Owner or the Architect, the Contractor shall without cost to the Owner submit to the Architect, in such form as the Architect may require, an accurate written estimate of the cost of any proposed extra Work or change. The estimate shall indicate the quantity and unit cost of each item of material, and the number of hours of work and hourly rate for each class of labor, as well as a description and the amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of material shall be shown if required by the Architect. The Contractor shall promptly revise and resubmit each estimate if the Architect determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors. If required by the Architect, in order to establish the exact cost of new Work added or of previously required Work omitted, the Contractor shall obtain and furnish to the Architect bona fide proposals from recognized suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the Contractor's expense. The Contractor shall state in the estimate any extension of time required for the completion of the Work if the change or extra work is ordered.__

PARAGRAPH 7.3 CONSTRUCTION CHANGE DIRECTIVES

A. Subparagraph 7.3.3: Delete the first sentence of the sub-section and replace as follows:

If the Construction Change Directive provides for an adjustment to the Contract Sum, and if the Contract Documents include a unit price for the work that is the subject of such directive, such unit price shall be the basis of the adjustment to the Contract Sum, unless the Owner, in its sole discretion, chooses another method. If, however, the Contract Documents do not include a unit price for such work, the adjustment shall be based on one of the following methods, as selected by the Owner:

In sub-heading .2 delete "stated in the Contract Documents or" after "Unit prices".

B. Delete Subparagraph 7.3.4 and replace as follows:

If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that, in the opinion of the Architect, application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner, the applicable unit prices shall be equitably adjusted.

C. Subparagraph 7.3.5: In the first sentence add after "the Work involved and" as follows:

, within five (5) calendar days from receipt of the Construction Change Directive,"; insert "by written notice" after "advise the Architect"; and add to the end of the sub-section as follows: Failure to so advise the Architect within such 5-day period (1) shall be interpreted as Contractor's agreement with the proposed method of adjustment; (2) shall constitute an irrevocable waiver of any right of the Contractor to submit a claim on account of the method of adjustment; and (3) shall cause the Construction Change Directive to be deemed and constitute a Change Order.

D. Subparagraph 7.3.6: In the second sentence delete "recorded as" after "immediately shall be" and replace with "deemed and shall constitute".__

E. Subparagraph 7.3.7: Delete and substitute the following:

"7.3.7 If none of the methods set forth in clauses 7.3.3.1, 7.3.3.2 or 7.3.3.3 are agreed upon for determining the cost or credit to the Owner resulting from a change in the work, the cost or credit shall be determined as follows:

7.3.7.1 For charges resulting in additional cost to the Owner, the cost shall be the actual computed cost and shall include the following:

.1 Labor, including foreman, (including Supplements).

.2 Materials entering permanently into the work.

.3 Use of equipment employed directly on the work.

.4 Power and consumable supplies for the operation of power equipment.

.5 Insurance (Workmen's Compensation, Social Security and Unemployment Insurance).

.6 Intentionally Omitted. .7 For work performed by the Contractor with his own forces, there shall be added a percentage fee for the Contractor equal to 15 percent of items (.1) through (.5) above.

.8 For work performed by a Subcontractor, there shall be added a percentage fee for the Subcontractor equal to 10 percent of items (.1) through (.5) above. To this total amount there shall be added an additional percentage fee of 5 percent for the Contractor.

.9 The percentage fee shall be compensation to cover the cost of supervision, overhead, profit and any other general expenses, which are not included in the cost of the work as defined above. Bond costs shall be added or deducted from the total cost of the change directive.

.10 The percentage fees as indicated herein shall also apply to Sub-Paragraph 7.3.3.

.11 Nothing in this article shall excuse the Contractor from proceeding with the extra work as directed.

.12 If Contractors are requested to submit lump sum proposal for extra work, such proposals shall include a detailed breakdown for all labor, materials and equipment, including a breakdown of subcontractors' prices."

.13 All change orders should be fully reviewed and vetted and must have merit before they are submitted to the Architect and Owner for review, otherwise they will be rejected and returned. Change orders for minimal dollar amounts are considered frivolous change orders and will not be reviewed (i.e. change orders foe $100-$500 amount is considered nickel/diming the project.

7.3.7.2 For changes resulting in a credit to the Owner, the cost shall be the estimated costs as they would have been expended according to 7.3.7.1, or the value or prorated value of said work submitted in the Contractor's Schedule of Values, whichever is greater."

F. Subparagraph 7.3.9: Delete the end of the first sentence starting after "Directive to the Owner," and replace as follows:

Amounts for such changes in the Work shall not be included in Applications for Payment. Such amounts shall only be included in an Application for Payment after the adjustment for the Construction Change Directive has been included in a Change Order signed by the Owner and the Contractor.

ARTICLE 8 TIME

PARAGRAPH 8.2

A. Subparagraph 8.2.2: In the first sentence delete ", except by agreement or instruction of the Owner in writing, prematurely".

B. Add new Subparagraphs 8.2.4 and 8.2.5 as follows:

§ 8.2.4 Unless specifically required by law, no payment under this Contract shall be due until the construction schedule, required by Section 3.10, and conforming to the requirements of the General Requirements has been accepted by the Architect.

§ 8.2.5 If the Architect in reviewing any Application for Payment determines that the amount of completed Work in place as certified by the Architect is less than 90% of the Work in place required by the Contractor's construction schedule or schedule of values provided for in Section 9.2, or that there have been delays to critical paths and the Contract completion date will not be met, or that, in the Owner's sole discretion, there is reasonable concern that the Work will not be Substantially Complete by the date required in the Contract Documents, the Contractor shall be required to submit a recovery schedule with a written description of the steps the Contractor intends to take to put the Project back on schedule. At the Owner's option, the Contractor shall take some or all of the following actions at no additional cost to the Owner:

.1 Increase the number of workers on the site, in such quantities and trades as will substantially eliminate the backlog of work;

.2 Increase the number of working hours per shift, shifts per day, working days per week, amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate backlog of work; or

.3 Reschedule activities so that the completion dates initially scheduled will be met.

PARAGRAPH 8.3. DELAYS AND EXTENSIONS OF TIME

A. Subparagraph 8.3.1: Insert "(except weather)" after "casualties or other causes" After "delay authorized by Owner", delete "pending mediation and arbitration". Add to the end of the Subparagraph as follows:

, and this shall be the Contractor's sole remedy for such delay. Under no circumstances will the Contractor be entitled to an increase in the Contract Sum, or to any other damages, on account of or in connection with any delay, regardless of the cause of such delay, and Contractor agrees not to make any claim for such damages, including, but not limited, claims for damages on account of having to perform out-of-sequence work, claims for damages on account of loss of production, and claims for damages on account of hindrances or interference with the work.

B. Delete Subparagraph 8.3.3 in its entirety.

C. Add new Subparagraphs 8.3.4 and 8.3.5 as follows:

§ 8.3.4 No extension of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contractor, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

§ 8.3.5 The Contractor hereby agrees that the Contractor shall have no claim for damages of any kind against the Owner or the Architect on account of any delay in the commencement of the Work and/or any hindrance, delay or suspension of any portion of the Work, whether such delay is caused by the Owner, the Architect, or otherwise, except as and to the extent expressly provided in G.L. c. 30, §39N. The Contractor acknowledges that the Contractor's sole remedy for any such delay and/or suspension will be an extension of time as provided in this Article. __

ARTICLE 9 PAYMENTS AND COMPLETION

PARAGRAPH 9.2

A. Add to the end of Subparagraph as follows:

, and shall be revised if later found by the Architect to be inaccurate. In addition, the Contractor shall submit to the Architect, at least 14 days before the first Application for Payment, a Cash Flow Schedule that shows the percentage completion to be obtained and the total dollar value of Work to be completed as of the first of each month until Substantial Completion. All calculations in the Cash Flow Schedule shall be on the basis of Work in place and shall exclude the value of materials delivered but not in place.

B. Add new Subparagraph 9.2.1 as follows:

§ 9.2.1 The Cash Flow Schedule shall be based on an orderly progression of the Work allowing adequate time for each operation (including adequate time for submission and review of submittals) and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Cash Flow

Schedule will be reviewed by the Architect for compliance with the requirements of the Contract Documents. Unless specifically required by law, no payment under this Contract shall be due until the Cash Flow Schedule has been reviewed and approved by the Architect. The Architect's review of the Cash Flow Schedule shall not impose any duty on the Architect or the Owner with respect to the timing, planning, scheduling or execution of the Work. In particular if the Contractor proposes a Cash Flow Schedule indicating a date of Substantial Completion which is earlier than the Contract Time the Contractor shall not be entitled to additional payment or compensation of any kind if for any reason the full Contract Time is required to achieve Substantial Completion of the Work.__

PARAGRAPH 9.3 APPLICATIONS FOR PAYMENT

A. Subparagraph 9.3.1: Delete 9.3.1.1 and add the following Clauses 9.3.1.3 and 9.3.1.4:

"9.3.1.3 Each application for payment shall include such instruments, evidence, and materials as the Owner, Owner's lender, or the title insurer shall require, including, without limitation, such requisition forms, disbursement requests, indemnities (including evidence of All Risk physical damage insurance coverage on materials and equipment stored off-site), and undertakings as they may specify and an estimate of the total labor done and materials stored at the site (or other location approved in writing by the Owner) or installed in the building, less costs for payment which has been made, and also less retainage specified in 9.6.3. All Applications for Payment shall be made on and in compliance with AIA Form G702, current edition, including a live Excel file unless otherwise specifically defined. Owner will advise Contractor in advance of what documentation it, its lender, or the title insurer will require with each payment application. Contractor shall supply such additional documentation and information as Owner's lender or its inspecting architect shall request in connection with each disbursement to the Contractor. Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner:

.1 A current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors and materialmen with whom the Contractor has entered in subcontracts, the amount of each subcontract, the amount requested for any Subcontractor and materialmen in the requested progress payment and the amount to be paid to the Contractor for such progress payment, together with similar sworn statements from all such Subcontractors and materialmen;

.2 Duly executed waivers of mechanic's lien and materialmen's liens from all Subcontractors and, when appropriate, from materialmen and lower tier Subcontractors establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment: and

.3 All information and materials required to comply with the requirements of the Contract Documents or reasonably requested by the Owner or the Architect"

"9.3.1.4 Contractors shall review a rough draft of each Application for Payment with the Owner's full time field representative and have it signed by him. The signed rough draft shall be submitted to the Architect along with the Application for Payment".

C. Subparagraph 9.3.1: Add the following Clause 9.3.1.4:

"9.3.1.4 Each application for payment shall include a copy of payroll records of the Contractor and Subcontractors for the period covered by the application for payment."

D. Add to the end of the Subparagraph 9.3.2: "The Owner may deduct the amount of such costs from payments due the Contractor."

PARAGRAPH 9.4 CERTIFICATES FOR PAYMENT

A. Subparagraph 9.4.1: Insert at the beginning of the first sentence as follows: Subject to Contractor's compliance with Section 9.3 and the provisions of Section 9.6. Delete remainder of sentence following "copy to the Contractor" and substitute the following:

" , for the percentage of work that the Architect determines to the best of his knowledge has been completed or notify the Contractor and Owner in writing his reasons for withholding a Certificate as provided in Subparagraph 9.5.1."

PARAGRAPH 9.5

A. Add new sub-headings .8, .9, .10, .11, and .12 to Subparagraph 9.5.1 as follows:

.8 failure of the Contractor or mechanical or electrical trade subcontractors to comply with requirements of the General Requirements for maintaining record drawings. The Contractor shall check record drawings each month. Written confirmation that the record drawings are current will be required by the Architect before approval of the Contractor's monthly payment requisition;

.9 failure of the Contractor to provide required warranties under Section 9.3, claims for direct payment, or reasonable evidence indicating probable filing of such claims;

.10 costs incurred by the Owner under Section 10.2.5;

.11 failure of the Contractor to submit prerequisite documentation required by the General Requirements; or

.12 liquidated damages due the Owner pursuant to Section 8.4.

B. Delete Subparagraph 9.5.3 in its entirety.

PARAGRAPH 9.6 PROGRESS PAYMENTS

A. Delete Subparagraph 9.6.3 and replace with the following:

"9.6.3 Retainage: There shall be retained 5 percent on the estimated amounts of completed work-in-place and on materials stored at the project site. Payment for material stored off site is subject to the conditions of Paragraph 9.3.2. No further or partial payments will be made after the time fixed for final completion of the work, or the time to which final completion may be extended under the terms of the Contract, until full and final completion and acceptance of the work. Payments for work under sub-contract of Contractors shall be subject to the above conditions applying to the prime contracts."

B. Subparagraph 9.6.4: Delete "If the Contractor fails to furnish such evidence within seven days," from the beginning of the second sentence.

C. Delete Subparagraph 9.6.5 in its entirety.

D. Delete Subparagraph 9.6.7 in its entirety.

E. Add new Subparagraph 9.6.8 as follows:

§ 9.6.8 Notwithstanding the provisions of Section 9.6 all progress payments shall be made in accordance with Chapter 30, Sections 39F, 39G and 39K (as appropriate) of the General Laws of the Commonwealth of Massachusetts, as amended.__

PARAGRAPH 9.7

Delete Paragraph 9.7 in its entirety.

PARAGRAPH 9.8 SUBSTANTIAL COMPLETION

A. Subparagraph 9.8.1: Add to the end of the Subparagraph as follows:

In addition, Substantial Completion for the entire Project shall be achieved only when: (1) the Owner has beneficial occupancy and use of the entire Project for all its intended uses; (2) all Project systems included in the Work are operational and acceptable to the Owner; (3) all governmental inspections for the Project have been successfully completed, all governmental approvals and related paperwork have been delivered to the Owner, and final and unconditional certificates of occupancy for the entire Project have been delivered to the Owner, (4) the only remaining Work to be performed is minor in nature and the remaining Work may reasonably be performed without having a material adverse effect on or materially interfering with the Owner's occupancy and use of the Project and (5) all prerequisites to Substantial Completion defined in the Contract Documents have been completed.

B. Subparagraph 9.8.2: Add to the end of the first sentence as follows:

together with the estimated value of completing or correcting such items (the "Punchlist") and (2) the permits and certificates referenced in Section 13.5. The Architect shall have the right to modify and supplement the Punchlist, including the estimated value of completion or correction.

C. Add the following to the end of 9.8.3:

"Should the Architect, on the basis of this second inspection, determine that the work is not substantially complete, the Contractor shall submit a request for a third inspection. The cost of this and any subsequent inspections, either by the Architect or his Engineers, relative to Substantial Completion shall be back charged to the Contractor."

D. Delete Subparagraph 9.8.5 and replace as follows:

The Certificate of Substantial Completion shall be submitted to the Owner and Contractor by the Architect. The certificate shall state the date of substantial completion, shall state any consequent responsibilities of the Contractor and the Owner in accordance with the Contract Documents. The Contractor shall complete and correct any incomplete and defective work within forty-five (45) calendar days from the date of Substantial Completion

E. Add the following Subparagraph 9.8.6:

"9.8.6 When the work or major portions thereof are substantially completed the Contractor shall submit to the Owner an application for payment of the remaining amount of the Contract balance. Upon receipt of such application the Owner shall approve and promptly pay the remaining amount of the Contract balance less two times the value of any remaining items to be completed and an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. As the remaining items of work are satisfactorily completed or corrected, the Owner shall promptly pay, upon receipt of a requisition, for these items less an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. Any claim, liens and adjustments referred to in this section shall pertain to the project and shall be filed in accordance with the terms of the applicable Contract and/or applicable laws."

PARAGRAPH 9.9

A. Subparagraph 9.1: Delete the end of the first sentence starting after "Work at any stage".

Delete the second sentence and replace as follows:

Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner has accepted in writing the responsibilities assigned to it and the Contractor for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance.

PARAGRAPH 9.10 FINAL COMPLETION AND FINAL PAYMENT

A. Subparagraph 9.10.1, First Sentence: Place period after the second mention of "Contract Documents" and delete the remainder of the sentence.

B. Add the following to the beginning of subparagraph 9.10.1.

"When contemplating application for final payment, the Contractor shall schedule, one week in advance with the Architect, a joint inspection visit to the Project to determine if the Contract has been fully executed."

C. Add Subparagraph 9.10.1.1 as follows:

"9.10.1.1 Should the Architect, on the basis of this final inspection, determine that the work is not complete, the Contractor shall complete the work, and issue a request for a second inspection. The cost of this and any subsequent inspections, either by the Architect or his Engineers shall be back charged to the Contractor."

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

PARAGRAPH 10.2

A. Subparagraph 10.2.1: Add new sub-heading .4 as follows:

.4 work or property of the Owner, its tenants, or other parties at or near the Project site with the Owner's permission.

B. Subparagraph 10.2.5: At the beginning and end of the first sentence: Delete "and" after

"10.2.1.2". Insert "and 10.2.1.4" after "10.2.1.3". Delete the remainder of the first sentence as follows:

> , except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

Add to the end of the sub-section as follows:

> Where the damage or loss presents an immediate danger to the public, the Owner, in its sole discretion and at the Contractor's expense, may promptly remedy such damage or loss without prior notice to the Contractor.

C. Add new Subparagraphs 10.2.9, 10.2.10, 10.2.11, 10.2.12, and 10.2.13 as follows:

§ 10.2.9 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

§ 10.2.10 The Contractor shall at all times protect excavations, trenches, buildings and materials from rain water, groundwater, backup or leakage of sewers, drains and other piping, and from water of any other origin and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

§ 10.2.11 The Contractor shall remove snow and ice which might result in damage or delay.

§ 10.2.12 During the progress of the Work and at all times prior to the date of Substantial Completion or occupancy of the Work by the Owner, whichever is earlier, the Contractor shall provide temporary heat, ventilation, and enclosure, adequate to permit the Work to proceed in a timely fashion, and to prevent damage to completed Work or Work in progress, or to materials stored on the premises. The use of the permanent heating and/or ventilation systems for temporary heat and/or ventilation shall be subject to the prior written approval of the Owner and Architect.

§ 10.2.13 [G.L. c.149, §44F(1)] The Contractor shall install weather protection and furnish adequate heat in the protected area from November 1 to March 31.

PARAGRAPH 10.3

A. Subparagraph 10.3.1: Delete the second sentence and replace as follows:

The Contractor shall not cause or permit any introduction onto, under, or near the Owner's property of any hazardous materials or substances as defined by any applicable law, and shall not cause of permit any release, discharge, transportation, storage, or disposal of such materials or substances onto, under, or near the Owner's property or areas near the Owner's property. If the Contractor encounters or recognizes on the site any material known or reasonably believed to be hazardous, including but not limited to asbestos or polychlorinated biphenyl (PCB), the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Contractor and the Owner shall cooperate in implementing measures to remove or contain said material and the Contractor shall comply with all directions of the Architect in the implementation of such removal or containment.

B Delete Subparagraphs 10.3.2, 10.3.3, and 10.3.4.

C. Subparagraph 10.3.5: Delete the remainder of the sentence starting after "obligations under" and replace as follows:

Article 10 or for any violation of applicable law related to the Contractor's noncompliance with the provisions of this Article 10.

D. Delete Subparagraph 10.3.6.

E. Add new Subparagraph 10.3.7 as follows:

§ 10.3.7 The parties anticipate that certain hazardous substances and/or materials may be discovered at the site. When such conditions are set forth in the Contract Documents, the Contractor acknowledges that such conditions have been considered in establishing the Contract Time and Contract Sum. No extension of the Contract Time or increase in the Contract Sum shall be claimed or allowed with respect to any hazardous substances or materials located at the site which were disclosed in the Contract Documents. The Contractor shall strictly comply with all laws, regulations, rules, orders, ordinances and the like related to the excavation, storage, removal and disposal of any such hazardous substances or materials.__

ARTICLE 11 INSURANCE AND BONDS

PARAGRAPH 11.1 CONTRACTOR'S LIABILITY INSURANCE and PARAGRAPH 11.2 OWNER'S LIABILITY INSURANCE

A. Delete Paragraphs 11.1 and 11.2 in their entirety and substitute the following:

"11.1 REQUIREMENTS

11.1.1 The Contractor shall purchase and maintain such insurance as will fully protect him from claims set forth below which may arise in whole or in part out of or result from the Contractor's execution of the Work, whether such execution be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

.1 Claims under workmen's compensation, disability benefit acts;

.2 Claims for damages because of bodily injury, occupational sickness or disease or death of his employees.

.3 Claims for damages because of bodily injury, sickness or disease or death of any person other than his employees.

.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor or (2) by any other person; and

.5 Claims for damages because of injury to or destruction of property, including loss of use resulting therefrom.

11.1.2 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the work. These Certificates shall contain a provision that coverages afforded under the policies will not be cancelled unless at least thirty (30) days' prior, written notice has been given to the Owner. Contractors' insurers to have A.M. Best Ratings of A-, VII or higher.

11.1.3 The Contractor shall furnish Certificates of Insurance of each Subcontractor employed in the performance of the work under this Contract, showing that said Subcontractors have complied with all the requirements of this Contract with reference to insurance to be furnished by such Subcontractor.

11.1.4 The Contractor shall procure and maintain, at his own expense during the Contract time, liability insurance as hereinafter specified:

1. Commercial General Liability ("CGL")

   a. Limits of Insurance of not less than:

$1,000,000	Each Occurrence
$1,000,000	Personal and Advertising Injury
$2,000,000	General Aggregate
$2,000,000	Products/Completed Operations Aggregate
$50,000	Fire Damage
$5,000	Medical Expense

   b. If the CGL coverage contains a General Aggregate Limit, such General Aggregate shall apply separately to each project.

   c. CGL coverage shall be written, and include the Broad Form Endorsement, on ISO Occurrence form CG 00 01-1093 or a substitute form providing equivalent coverage and shall cover liability arising from yet not limited to premises, operations, independent contractors, products – completed operations, and personal and advertising injury.

   d. The Owner, and all other parties required by the Owner shall be included as insureds on the CGLs, using ISO Additional Insured Endorsement CG 20 10 (11 85) or CG 20 10 (10 93) and CG 20 37 (10 01) or CG 20 33 (10 01) and CG 20 37 (10 01) or a substitute providing equivalent coverage to the additional insureds. This insurance for the additional insureds shall be as broad as the coverage provided for the named insured Subcontractor. It shall apply as primary and noncontributing insurance before any other insurance or self-insurance, including any deductible maintained by or provided to the additional insureds.

   e. Attached to each certificate of insurance shall be a copy of the Additional Insured Endorsement addressed in section (d) above.

   f. Subcontractors shall maintain CGL coverage for itself and all additional insureds for the duration of the project and maintain Completed Operations coverage for itself and each additional insured for at least three (3) years after completion of the Work.

2. Automobile Liability

a. Business Automobile Liability with limits of not less than $1,000,000 combined single limit.

b. Business Auto coverage must include coverage for liability arising out of all owned, leased, hired, and non-owned automobiles.

c. The Owner, and all other parties required by the Owner shall be included as additional insureds on the auto policy.

3. Commercial Umbrella

a. General Contractor: Umbrella limits must be at least $5,000,000 with a per project aggregate.
Subcontractor: Umbrella limits must be at least $5,000,000 with a per project aggregate.

b. Umbrella coverage must include as insureds all entities that are additional insureds on the CGL.

c. Umbrella coverage for such additional insureds shall apply as primary and noncontributing insurance before any other insurance or self-insurance, including any deductible maintained by, or provided to the additional insureds other than the CGL, Auto Liability, and Employers Liability coverages maintained by the Subcontractor.

4. Workers Compensation and Employers Liability

a. Employers Liability Insurance limits must be at least $500,000 each accident for bodily injury by accident, $500,000 each employee for injury by disease, and $500,000 each disease – policy limit.

b. Where applicable, U.S. Longshore and Harborworkers Compensation Act Endorsement shall be attached to the policy.

c. Where applicable the Maritime Coverage Endorsement (Jones Act) shall be attached to the policy.

5. Pollution Liability Policy:

a. Pollution limit must be at least $1,000,000 per incident with a per project aggregate.

b. Pollution coverage must include as insureds all entities that are additional insureds on the commercial general liability policy.

11.1.5 The following types of Liability Insurance shall be furnished.

.1 Contractor's Protective Liability Insurance issued to and covering the liability for damages imposed by law upon the Contractor with respect to all work performed by him under this Contract.

.2 Contractor's Protective Liability Insurance issued to and covering the liability for damages imposed by law upon the Contractor with respect to all work under this Contract performed for the Contractor by Subcontractors.

.3 Contractual Liability Insurance issued to and covering the liability imposed by Contract upon the Owner for work performed on private land with respect to all operations under the Agreement by the Contractor or by his Subcontractors.

.4 Contractual Liability Insurance issued to and covering the liability imposed by Contract upon the Owner for work performed on private land with respect to all operations under the Agreement by the Contractor or by his Subcontractors.

11.1.6 The Contractor shall acquire and maintain Fire Insurance, All Risk, Builders Risk Completed Value Insurance Policy and installation floater, upon the project to the full insurable value thereof. The named insured shall be the Owner, STV Incorporated, the Contractor and Subcontractors as their interest may appear. This provision shall in no way release the Contractor or Contractor's surety from obligations under the Contract Documents to fully complete the project. This insurance shall cover all the work in place and all materials stored at the building site or at any other location or while in transit, whether or not covered by partial payments made by the Owner during the contract time and until work is accepted by the Owner.

PARAGRAPH 11.3 PROPERTY INSURANCE

A. Delete Subparagraph 11.3.1 and replace as follows:

1. The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. Coverage for such liability insurance shall be provided by a company or companies reasonably acceptable to the Owner. Contractor shall furnish to Owner written confirmation as to the insurance carrier's most current financial ratings prior to commencing work. Such insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the work and shall insure against the perils of fire and extended coverage and shall include "all risks" insurance for physical loss or damage including without duplication, theft, vandalism and malicious mischief. This insurance shall also cover portions of the Work stored off the site or in transit. If this insurance is written with stipulated amounts deductible, the Owner shall not be responsible for any difference between the payments made by the insurance carrier and the claim. The policy shall contain a provision that coverages afforded under policies will not be canceled or allowed to expire until at least 30 days' written notice has been given to the Owner. The Owner shall be named insured within the policy.

2. Delete Clauses 11.3.1..1, 11.3.1.2, 11.3.1.3, 11.3.1.4 and 11.3.1.5 in their entirety.

D. Delete Subparagraphs 11.3.2, 11.3.3, 11.3.4 and 11.3.5in their entirety.

E. Subparagraph 11.3.6: Delete in its entirety and substitute the following:

"11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner two certified copies of the policy or policies providing this Property Insurance coverage, each containing those endorsements specifically related to the Project. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Contractor."

F. Delete Subparagraph 11.3.7 in its entirety and replace with the following:

Waiver of Subrogation: Contractor and any Subcontractors waive all rights against Owner, Architect, and their agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by commercial general liability, commercial umbrella liability, business automobile liability, or workers compensation and employers liability insurance maintained per the requirements stated above.

G. Subparagraph 11.3.8:

1. Line 1: Change "Owner's" to "this."

2. Lines 1 & 2: change "Owner" to "Contractor."

H. Subparagraph 11.3.9, Lines 1, 2, 3: Change "Owner" to "Contractor."

I. Subparagraph 11.3.10, Lines 1, 2, 3: Change "Owner" to "Contractor."

PARAGRAPH 11.4 PERFORMANCE BOND AND PAYMENT BOND

A. Delete Subparagraphs 11.4.1 and 11.4.2 in their entirety and replace with 11.4.1 through 11.4.5 as follows:

"11.4.1 Prior to execution of the contract the successful bidder shall furnish the Owner with Payment and Performance bonds covering the faithful performance of the contract and the payment of all obligations arising thereunder, respectively.

11.4.2 Bonds shall be in the amount of one hundred percent of the contract amount.

11.4.3 Bonds shall be prepared on forms satisfactory to the Owner.

11.4.4 Bonds shall include coverage of all obligations of the Contractor during the specified guarantee period.

11.4.5 Surety Company or Companies must be qualified to do business in the Commonwealth of Massachusetts and acceptable to the Owner."

ARTICLE 13 MISCELLANEOUS PROVISIONS

PARAGRAPH 13.1 GOVERNING LAW

A. Delete text in its entirety and replace with the following:

" The State of Massachusetts, County of Hampshire shall be the respective jurisdiction and venue for any legal action arising out of or in connection with this Contract. The laws of the State of Massachusetts shall apply with regard to construction, interpretation, performance and information pertaining to this Contract."

PARAGRAPH 13.2

A. Subparagraph 13.2.1: In the second sentence delete "Except as provided in Section 13.2.2".

B. Delete Subparagraph 13.2.2 in its entirety.

PARAGRAPH 13.5

A. Delete Subparagraph 13.5.4 and replace as follows:

The Contractor shall obtain and deliver promptly to the Architect any occupancy permit and any certificates of final inspection of any part of the Contractor's work and operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work.

PARAGRAPH 13.7

A. 13.7 Delete section 13.7 and replace with the following:

It is expressly agreed that the obligations of the Contractor hereunder arise out of contractual duties, and that the failure of the Contractor to comply with the requirements of the Contract Documents shall constitute a breach of contract, not a tort, for the purpose of applicable statutes of limitation and repose. Any cause of action which the Owner may have on account of such failure shall be deemed to accrue only when the Owner has obtained actual knowledge of such failure, not before.

PARAGRAPH 13.8

A. 13.8 Add new Paragraph 13.8 as follows:

§ 13.8 LIMITATION OF LIABILITY

§ 13.8.1 The Owner shall be liable, if ever, only to the extent of its interest in the Project; and no officer, director, partner, agent or employee of the Owner shall ever be personally or individually liable with respect to this Contract or the Work. Each Subcontract shall include the foregoing limitation, which shall be effective if the Owner ever succeeds to the Contractor's rights and obligations under a Subcontract.

PARAGRAPH 13.9

A. Add new Paragraph 13.9 as follows:

§ 13.9 DEFENSE OF SUITS

§ 13.9.1 The Contractor shall be responsible for, shall defend and pay all costs, attorneys' fees and liabilities both direct and indirect as a result of suits arising out of this Contract.

§ 13.9.2 Neither final acceptance nor occupation of the premises by the Owner shall relieve the Contractor of responsibility for all claims for labor, materials, and equipment arising out of this Contract.

§ 13.9.3 The Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses, and expenses including attorneys' fees arising out of or resulting from the performance of the work.__

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

PARAGRAPH 14.1

A. Subparagraph 14.1.1: Insert in the beginning of the first sentence as follows: "Provided that the Contractor is not in breach of any of its obligations under the Contract,"

Delete sub-headings .1, .2, and .4.

B. Delete Subparagraph 14.1.2.

C. Delete Subparagraph 14.1.3 and replace as follows:

If one of the above reasons exists, the Contractor may, upon seven days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work properly executed and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. The payment for materials or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to the Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interest.

D. Delete Subparagraph 14.1.4.__

PARAGRAPH 14.2

A. Subparagraph 14.2.1: Delete "repeatedly" from the beginning of sub-headings .1 and .3.

Insert new sub-headings .4 and .5 after sub-heading .3 as follows:

.4 becomes the subject of a voluntary petition in bankruptcy or any voluntary proceeding related to insolvency, receivership, liquidation or comparable proceeding or any assignment for the benefit of creditors or becomes the subject of an involuntary petition in bankruptcy or any involuntary proceeding related to insolvency, receivership, liquidation or comparable proceeding or any assignment for the benefit of creditors.

.5 submits three successive Applications for Payment, each of which indicate that the actual Work completed is less than 90 percent of the values estimated in the construction schedule (submitted by the Contractor pursuant to Section 3.10.1) to be completed by the respective dates.

B. Subparagraph 14.2.2: In the first sentence delete ",upon certification by the Initial Decision Maker that sufficient cause exists to justify such action,".

Delete the second sentence of sub-heading .3.

C. Subparagraph 14.2.4: In the first sentence: Insert "all costs and losses incurred by the Owner on account of the Contractor's failure to comply with the Contract Documents and" after "the Work, including". Insert "and Owner's Project Manager's" after "for the Architect's".

Delete the last sentence of the sub-section and replace as follows:

"The Owner shall be entitled to hold all amounts due the Contractor at the date of termination until all of the Owner's damages have been established, and to apply such amounts to such damages."

PARAGRAPH 14.3

A. Subparagraph 14.3.2 Insert ", subject to compliance with the conditions of Section 8.3." at the end of the first sentence. Delete the second sentence.

PARAGRAPH 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

A. Subparagraph 14.4.2: In sub-heading .3 delete "and" after "all existing contracts" and replace with "except for subcontracts, if any, that Owner elects to assume, terminate all"

B. Delete Subparagraph 14.4.3 and replace with the following: In the event that the Contract is terminated for the Owner's convenience, the Contractor shall be reimbursed in accordance with the Contract Documents for all Work properly performed up to the termination date, and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. Payment for materials or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to the Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interest. The Contractor shall not be entitled to payment for overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

PARAGRAPH 15.1 CLAIMS

A. Subparagraph 15.1.1: Delete sub-section 15.1.1 and replace as follows:

§ 15.1.1 DEFINITION

The word "Claim" shall mean a written demand by the Contractor for an increase in the Contract Time or the Contract Sum. The Contractor is responsible for substantiating its Claims. The word "Claim" shall not include claims by the Owner. The Owner may withhold from the Contractor the value of any claims against the Contractor in accordance with Massachusetts General Laws, including, but not limited to, Sections 39G and 39K of Chapter 30.

B. Subparagraph 15.1.2: Delete sub-section 15.1.2 and replace as follows:

§ 15.1.2 NOTICE OF CLAIMS

Contractor must initiate Claims within fourteen (14) calendar days after occurrence of the event giving rise to such Claim by written notice to the Architect and the Owner. Such written notice must (1) be signed by the Contractor; (2) conspicuously identify on its face that the notice serves as a notice of claim; (3) explain in sufficient detail the basis of the Claim; (4) identify the date of the event giving

rise to such Claim; and (5) state the exact dollar amount of the increase in the Contract Sum being requested, if any, and the number of days extension to the Contract Time sought, if any.

C. Subparagraph 15.1.3: Delete "Section 9.7 and" after "as provided in".

Delete the final sentence.__

D. Subparagraph 15.1.5: First Sentence: Delete period after "given" and add "and a statement of why additional time is necessary." In the second sentence delete "of cost and" after "include an estimate".

E. Delete Subparagraph 15.1.5.2

F. Delete Subparagraph 15.1.6

PARAGRAPH 15.2 INITIAL DECISION

A. Subparagraph 15.2.1: In the third sentence: Delete "mediation" after "condition precedent" and delete the end of the sentence beginning after "payment is due".

B. Delete Subparagraph 15.2.2 and replace as follows:

The Initial Decision Maker will review Claims and within 30 days of the receipt of the Claim take one or more of the following actions: (1) request additional supporting data from the Contractor; (2) notify the Contractor that the Initial Decision Maker requires additional time to resolve the Claim; and/or (3) reject the Claim in whole or in part.

C. Subparagraph 15.2.3: Delete the last sentence.

D. Delete Subparagraph 15.2.4 and replace as follows:

If the Architect requests the Contractor to furnish additional supporting data in connection with a Claim, the Contractor shall provide such data within ten (10) calendar days of such request. If the Contractor is of the opinion that it is impossible to provide such data within such time, the Contractor shall notify the Architect of such opinion in writing within such ten-day period. If the Architect determines that it is impossible for such data to be provided within such ten-day period through no fault of the Contractor, the Contractor shall provide such data within 30 calendar days of the Architect's request, unless the Architect fixes another date, in which case the data must be submitted by the date so fixed. Failure of the Contractor to provide such data within the time prescribed herein shall result in the irrevocable waiver of the Claim.

E. Subparagraph 15.2.5: Delete the last sentence and replace as follows: The rejection of a claim by the Architect and any decisions of the Owner with respect to the same, and the interpretations by the Architect of the plans, drawings and specifications, shall be final and binding on the Contractor in accordance with Section 39J of Chapter 30 of the Massachusetts General Laws.

F. Delete Subparagraph 15.2.6 in is entirety.

G. Subparagraph 15.2.7: Delete the capitalized word, “Claim,” and replace with lower-case word, “claim,” in the first and second sentences.

H. Delete Subparagraph 15.2.8.

PARAGRAPH 15.3 MEDIATION

A. Delete this paragraph in its entirety..

PARAGRAPH 15.4 ARBITRATION

A. Delete this paragraph in its entirety.

END OF SUPPLEMENTARY CONDITIONS

DOCUMENT 007150 – PREVAILING WAGE RATES

1.1 PREVAILING WAGE RATES

A. The Commonwealth of Massachusetts Executive Office of Labor and Workforce Development Department of Labor Standards Prevailing Wage is bound herein immediately following this page.

END OF DOCUMENT 007150

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:	Pioneer Valley Transit Authority	**City/Town:**	SPRINGFIELD
Contract Number:	IFB #26-016		
Description of Work:	Furnishing and installing two electrical vehicle chargers and their associated infrastructure to support charging of the PVTA's paratransit van fleet. Including, underground concrete encased ductbank installation		
Job Location:	2840 Main Street, Springfield, MA 01107		

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3) For apprentice rates see "Apprentice- PILE DRIVER"	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE) For apprentice rates see "Apprentice- LABORER"	6/1/2026	$37.75	$10.90	$9.75	$8.62	$0.00	$67.02
	12/7/2026	$39.05	$10.90	$9.75	$8.62	$0.00	$68.32
	6/7/2027	$40.45	$10.90	$9.75	$8.62	$0.00	$69.72
	12/6/2027	$41.85	$10.90	$9.75	$8.62	$0.00	$71.12
	6/5/2028	$43.35	$10.90	$9.75	$8.62	$0.00	$72.62
	12/4/2028	$44.85	$10.90	$9.75	$8.62	$0.00	$74.12
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
ASBESTOS WORKER (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)	12/1/2025	$40.32	$14.50	$4.30	$6.25	$0.00	$65.37
ASPHALT RAKER LABORERS LABORERS - ZONE 3 (BUILDING & SITE) For apprentice rates see "Apprentice- LABORER"	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
BATCH/CEMENT PLANT - ON SITE OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BLOCK PAVER, RAMMER / CURB SETTER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.75	$10.90	$9.75	$8.62	$0.00	$67.02
	12/7/2026	$39.05	$10.90	$9.75	$8.62	$0.00	$68.32
	6/7/2027	$40.45	$10.90	$9.75	$8.62	$0.00	$69.72
	12/6/2027	$41.85	$10.90	$9.75	$8.62	$0.00	$71.12
	6/5/2028	$43.35	$10.90	$9.75	$8.62	$0.00	$72.62
	12/4/2028	$44.85	$10.90	$9.75	$8.62	$0.00	$74.12
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
BOILER MAKER BOILERMAKERS LOCAL 29 BOILERMAKERS LOCAL 29	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
2	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
3	70.00	$33.68	$7.07	$10.03	$4.20	$0.00	$54.98
4	75.00	$36.09	$7.07	$10.74	$4.50	$0.00	$58.40
5	80.00	$38.50	$7.07	$11.45	$4.80	$0.00	$61.82
6	85.00	$40.90	$7.07	$12.18	$5.10	$0.00	$65.25
7	90.00	$43.31	$7.07	$12.88	$5.40	$0.00	$68.66
8	95.00	$45.71	$7.07	$13.62	$5.70	$0.00	$72.10

Apprentice to Journeyworker Ratio: 1:4

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	2/1/2026	$56.36	$12.84	$15.57	$5.89	$0.00	$90.66
BRICKLAYERS LOCAL 3	8/1/2026	$58.56	$12.84	$15.57	$5.89	$0.00	$92.86
BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)	2/1/2027	$59.96	$12.84	$15.57	$5.89	$0.00	$94.26

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$28.18	$12.84	$15.57	$5.89	$0.00	$62.48
2	60.00	$33.82	$12.84	$15.57	$5.89	$0.00	$68.12
3	70.00	$39.45	$12.84	$15.57	$5.89	$0.00	$73.75
4	80.00	$45.09	$12.84	$15.57	$5.89	$0.00	$79.39
5	90.00	$50.72	$12.84	$15.57	$5.89	$0.00	$85.02

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.28	$12.84	$15.57	$5.89	$0.00	$63.58
2	60.00	$35.14	$12.84	$15.57	$5.89	$0.00	$69.44
3	70.00	$40.99	$12.84	$15.57	$5.89	$0.00	$75.29
4	80.00	$46.85	$12.84	$15.57	$5.89	$0.00	$81.15
5	90.00	$52.70	$12.84	$15.57	$5.89	$0.00	$87.00

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
CAISSON & UNDERPINNING BOTTOM MAN LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$50.40	$10.90	$9.75	$9.80	$0.00	$80.85
	12/1/2026	$51.90	$10.90	$9.75	$9.80	$0.00	$82.35
CAISSON & UNDERPINNING LABORER LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
CAISSON & UNDERPINNING TOP MAN LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$49.58	$10.90	$9.75	$9.80	$0.00	$80.03
	12/1/2026	$51.08	$10.90	$9.75	$9.80	$0.00	$81.53
CARBIDE CORE DRILL OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62

For apprentice rates see "Apprentice- LABORER"

CARPENTER	3/1/2026	$43.81	$9.19	$11.25	$6.90	$0.00	$71.15
CARPENTERS	9/1/2026	$44.76	$9.19	$11.25	$6.90	$0.00	$72.10
CARPENTERS LOCAL 336 - HAMPDEN HAMPSHIRE FRANKLIN	3/1/2027	$45.66	$9.19	$11.25	$6.90	$0.00	$73.00

Apprentice: CARPENTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.71	$9.19	$0.00	$1.38	$0.00	$30.28
2	45.00	$19.71	$1.28	$0.00	$1.38	$0.00	$22.37
3	55.00	$24.10	$9.19	$0.00	$2.76	$0.00	$36.05
4	55.00	$24.10	$9.19	$0.00	$2.76	$0.00	$36.05
5	70.00	$30.67	$9.19	$11.25	$4.14	$0.00	$55.25
6	70.00	$30.67	$9.19	$11.25	$4.14	$0.00	$55.25
7	80.00	$35.05	$9.19	$11.25	$5.52	$0.00	$61.01
8	80.00	$35.05	$9.19	$11.25	$5.52	$0.00	$61.01

Apprentice: CARPENTER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$20.14	$9.19	$0.00	$1.38	$0.00	$30.71
2	45.00	$20.14	$9.19	$0.00	$1.38	$0.00	$30.71
3	55.00	$24.62	$9.19	$0.00	$2.76	$0.00	$36.57
4	55.00	$24.62	$9.19	$0.00	$2.76	$0.00	$36.57
5	70.00	$31.33	$9.19	$11.25	$4.14	$0.00	$55.91
6	70.00	$31.33	$9.19	$11.25	$4.14	$0.00	$55.91
7	80.00	$35.81	$9.19	$11.25	$5.52	$0.00	$61.77
8	80.00	$35.81	$9.19	$11.25	$5.52	$0.00	$61.77

Apprentice to Journeyworker Ratio: 1:5

CARPENTER WOOD FRAME	10/1/2025	$27.37	$7.38	$4.47	$1.00	$0.00	$40.22
CARPENTERS	10/1/2026	$28.47	$7.38	$4.47	$1.00	$0.00	$41.32
CARPENTERS-ZONE 3 (Wood Frame)							

All Aspects of New Wood Frame Work

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80

Construction

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

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
2	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
3	65.00	$18.51	$7.38	$0.00	$1.00	$0.00	$26.89
4	70.00	$19.93	$7.38	$0.00	$1.00	$0.00	$28.31
5	75.00	$21.35	$7.38	$3.80	$1.00	$0.00	$33.53
6	80.00	$22.78	$7.38	$3.80	$1.00	$0.00	$34.96
7	85.00	$24.20	$7.38	$3.80	$1.00	$0.00	$36.38
8	90.00	$25.62	$7.38	$3.80	$1.00	$0.00	$37.80

Apprentice to Journeyworker Ratio: 1:5

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING PLASTERERS AND CEMENT MASONS LOCAL 534 Plasterers and Cement Masons - Zone 2	1/1/2026	$48.13	$13.20	$16.30	$2.93	$1.69	$82.25
	7/1/2026	$49.32	$13.20	$16.30	$2.93	$1.69	$83.44
	1/1/2027	$50.51	$13.20	$16.30	$2.93	$1.69	$84.63
	7/1/2027	$51.70	$13.20	$16.30	$2.93	$1.69	$85.82
	1/1/2028	$52.89	$13.20	$16.30	$2.93	$1.69	$87.01

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.07	$13.20	$16.30	$0.00	$0.00	$53.57
2	60.00	$28.88	$13.20	$16.30	$2.93	$1.69	$63.00
3	65.00	$31.28	$13.20	$16.30	$2.93	$1.69	$65.40
4	70.00	$33.69	$13.20	$16.30	$2.93	$1.69	$67.81
5	75.00	$36.10	$13.20	$16.30	$2.93	$1.69	$70.22
6	80.00	$38.50	$13.20	$16.30	$2.93	$1.69	$72.62
7	90.00	$43.32	$13.20	$16.30	$2.93	$1.69	$77.44

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CEMENT MASONRY/PLASTERING							
Effective Date: 7/1/2026							

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.66	$13.20	$16.30	$0.00	$0.00	$54.16
2	60.00	$29.59	$13.20	$16.30	$2.93	$1.69	$63.71
3	65.00	$32.06	$13.20	$16.30	$2.93	$1.69	$66.18
4	70.00	$34.52	$13.20	$16.30	$2.93	$1.69	$68.64
5	75.00	$36.99	$13.20	$16.30	$2.93	$1.69	$71.11
6	80.00	$39.46	$13.20	$16.30	$2.93	$1.69	$73.58
7	90.00	$44.39	$13.20	$16.30	$2.93	$0.00	$76.82

Apprentice to Journeyworker Ratio: 1:5

CHAIN SAW OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CRANE OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$43.06	$13.78	$12.15	$3.00	$0.00	$71.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Apprentice: DELEADER (BRIDGE)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:1							
DEMO: ADZEMAN LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$78.11	$10.08	$11.62	$12.67	$0.00	$112.48
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN (Including Core Drilling) ELECTRICIANS LOCAL 7 ELECTRICIANS LOCAL 7	12/28/2025	$53.26	$13.75	$8.40	$6.96	$0.00	$82.37
	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37

Apprentice: ELECTRICIAN (Including Core Drilling)

Effective Date: 12/28/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.30	$7.65	$0.63	$0.00	$0.00	$29.58
2	45.00	$23.97	$7.65	$0.70	$0.00	$0.00	$32.32
3	50.00	$26.63	$13.75	$7.53	$0.00	$0.00	$47.91
4	55.00	$29.29	$13.75	$7.61	$0.00	$0.00	$50.65
5	65.00	$34.62	$13.75	$9.84	$0.00	$0.00	$58.21
6	70.00	$37.28	$13.75	$11.30	$0.00	$0.00	$62.33

Apprentice: ELECTRICIAN (Including Core Drilling)

Effective Date: 6/28/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.76	$7.80	$0.63	$0.00	$0.00	$30.19
2	45.00	$24.48	$7.80	$0.70	$0.00	$0.00	$32.98
3	50.00	$27.21	$14.00	$7.53	$0.00	$0.00	$48.74
4	55.00	$29.93	$14.00	$7.61	$0.00	$0.00	$51.54
5	65.00	$35.37	$14.00	$9.84	$0.00	$0.00	$59.21
6	70.00	$38.09	$14.00	$11.30	$0.00	$0.00	$63.39

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 2:3							
ELEVATOR CONSTRUCTOR	1/1/2026	$69.23	$16.38	$11.06	$10.70	$0.00	$107.37
ELEVATOR CONSTRUCTORS LOCAL 41	1/1/2027	$72.23	$16.48	$11.16	$11.00	$0.00	$110.87
ELEVATOR CONSTRUCTORS LOCAL 41							

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.62	$16.38	$0.00	$0.00	$0.00	$51.00
2	55.00	$38.08	$16.38	$11.06	$10.70	$0.00	$76.22
3	65.00	$45.00	$16.38	$11.06	$10.70	$0.00	$83.14
4	70.00	$48.46	$16.38	$11.06	$10.70	$0.00	$86.60
5	80.00	$55.38	$16.38	$11.06	$10.70	$0.00	$93.52

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$36.12	$16.48	$0.00	$0.00	$0.00	$52.60
2	55.00	$39.73	$16.48	$11.16	$11.00	$0.00	$78.37
3	65.00	$46.95	$16.48	$11.16	$11.00	$0.00	$85.59
4	70.00	$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
5	80.00	$57.78	$16.48	$11.16	$11.00	$0.00	$96.42

Apprentice to Journeyworker Ratio: 1:1							
ELEVATOR CONSTRUCTOR HELPER	1/1/2026	$48.46	$16.38	$11.06	$10.70	$0.00	$86.60
ELEVATOR CONSTRUCTORS LOCAL 41	1/1/2027	$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
ELEVATOR CONSTRUCTORS LOCAL 41							
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
LABORERS	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
LABORERS - ZONE 3 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY	6/1/1999	$18.84	$4.80	$4.10	$0.00	$0.00	$27.74
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY	6/1/1999	$21.33	$4.80	$4.10	$0.00	$0.00	$30.23
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY	6/1/1999	$22.33	$4.80	$4.10	$0.00	$0.00	$31.23
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
FIRE ALARM INSTALLER	12/28/2025	$53.26	$13.75	$8.40	$6.96	$0.00	$82.37
ELECTRICIANS LOCAL 7	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
ELECTRICIANS LOCAL 7	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	12/28/2025	$53.26	$13.75	$8.40	$6.96	$0.00	$82.37
/ COMMISSIONING	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
ELECTRICIANS LOCAL 7	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
ELECTRICIANS LOCAL 7							
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							

Apprentice: FIREMAN

Effective Date: 12/1/2023

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$23.42	$13.78	$12.15	$3.00	$0.00	$52.35
2	70.00	$27.32	$13.78	$12.15	$3.00	$0.00	$56.25
3	80.00	$31.22	$13.78	$12.15	$3.00	$0.00	$60.15
4	90.00	$35.13	$13.78	$12.15	$3.00	$0.00	$64.06

Apprentice to Journeyworker Ratio: 1:6

FLAGGER & SIGNALER (HEAVY & HIGHWAY)	6/1/2026	$29.21	$10.90	$9.75	$6.60	$0.00	$56.46
LABORERS	12/1/2026	$29.21	$10.90	$9.75	$6.60	$0.00	$56.46
LABORERS - ZONE 3 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FLOORCOVERER	3/1/2026	$44.34	$8.56	$11.25	$6.90	$0.00	$71.05
FLOORCOVERERS LOCAL 2168	9/1/2026	$45.29	$8.56	$11.25	$6.90	$0.00	$72.00
FLOORCOVERERS LOCAL 2168 ZONE III	3/1/2027	$46.19	$8.56	$11.25	$6.90	$0.00	$72.90

Apprentice: FLOORCOVERER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.95	$8.56	$0.00	$1.38	$0.00	$29.89
2	45.00	$19.95	$8.56	$0.00	$1.38	$0.00	$29.89
3	55.00	$24.39	$8.56	$0.00	$2.76	$0.00	$35.71
4	55.00	$24.39	$8.56	$0.00	$2.76	$0.00	$35.71
5	70.00	$31.04	$8.56	$11.25	$4.14	$0.00	$54.99
6	70.00	$31.04	$8.56	$11.25	$4.14	$0.00	$54.99
7	80.00	$35.47	$8.56	$11.25	$5.52	$0.00	$60.80
8	80.00	$35.47	$8.56	$11.25	$5.52	$0.00	$60.80

Construction

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

Apprentice: FLOORCOVERER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$20.38	$8.56	$0.00	$1.38	$0.00	$30.32
2	45.00	$20.38	$8.56	$0.00	$1.38	$0.00	$30.32
3	55.00	$24.91	$8.56	$0.00	$2.76	$0.00	$36.23
4	55.00	$24.91	$8.56	$0.00	$2.76	$0.00	$36.23
5	70.00	$31.70	$8.56	$11.25	$4.14	$0.00	$55.65
6	70.00	$31.70	$8.56	$11.25	$4.14	$0.00	$55.65
7	80.00	$36.23	$8.56	$11.25	$5.52	$0.00	$61.56
8	80.00	$36.23	$8.56	$11.25	$5.52	$0.00	$61.56

Apprentice Notes

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

FORK LIFT OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.25	$13.78	$12.15	$3.00	$0.00	$68.18

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATORS/LIGHTING PLANTS OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$35.80	$13.78	$12.15	$3.00	$0.00	$64.73

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 1333 GLAZIERS LOCAL 1333	6/1/2026	$44.73	$11.20	$8.40	$6.05	$0.00	$70.38
	6/1/2027	$46.73	$11.60	$8.55	$6.60	$0.00	$73.48
	6/1/2028	$48.73	$12.00	$8.70	$7.20	$0.00	$76.63

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$22.37	$11.20	$8.40	$6.05	$0.00	$48.02
2	56.25	$25.16	$11.20	$8.40	$6.05	$0.00	$50.81
3	62.50	$27.96	$11.20	$8.40	$6.05	$0.00	$53.61
4	68.75	$30.75	$11.20	$8.40	$6.05	$0.00	$56.40
5	75.00	$33.55	$11.20	$8.40	$6.05	$0.00	$59.20
6	81.25	$36.34	$11.20	$8.40	$6.05	$0.00	$61.99
7	87.50	$39.14	$11.20	$8.40	$6.05	$0.00	$64.79
8	93.75	$41.93	$11.20	$8.40	$6.05	$0.00	$67.58

Construction

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

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.37	$11.60	$8.55	$6.60	$0.00	$50.12
2	56.25	$26.29	$11.60	$8.55	$6.60	$0.00	$53.04
3	62.50	$29.21	$11.60	$8.55	$6.60	$0.00	$55.96
4	68.75	$32.13	$11.60	$8.55	$6.60	$0.00	$58.88
5	75.00	$35.05	$11.60	$8.55	$6.60	$0.00	$61.80
6	81.25	$37.97	$11.60	$8.55	$6.60	$0.00	$64.72
7	87.50	$40.89	$11.60	$8.55	$6.60	$0.00	$67.64
8	93.75	$43.81	$11.60	$8.55	$6.60	$0.00	$70.56

Apprentice to Journeyworker Ratio: 3:1

GRADER/TRENCHING MACHINE/DERRICK OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 7 ELECTRICIANS LOCAL 7	12/28/2025	$53.26	$13.75	$8.40	$6.96	$0.00	$82.37
	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER) PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY)	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)	9/1/2025	$48.27	$14.75	$9.52	$10.09	$0.00	$82.63
	9/1/2026	$51.01	$14.75	$9.52	$10.09	$0.00	$85.37

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.14	$14.75	$9.27	$5.05	$0.00	$53.21
2	60.00	$28.96	$14.75	$9.32	$6.05	$0.00	$59.08
3	70.00	$33.79	$14.75	$9.37	$7.06	$0.00	$64.97
4	80.00	$38.62	$14.75	$9.42	$8.07	$0.00	$70.86

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.51	$14.75	$9.27	$5.05	$0.00	$54.58
2	60.00	$30.61	$14.75	$9.32	$6.05	$0.00	$60.73
3	70.00	$35.71	$14.75	$9.37	$7.06	$0.00	$66.89
4	80.00	$40.81	$14.75	$9.42	$8.07	$0.00	$73.05

Apprentice to Journeyworker Ratio: 1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 7 IRONWORKERS LOCAL 7 (SPRINGFIELD AREA)	3/16/2024	$40.66	$8.25	$12.70	$10.00	$0.00	$71.61

Apprentice: IRONWORKER/WELDER

Effective Date: 3/16/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$24.40	$8.25	$12.70	$10.00	$0.00	$55.35
2	70.00	$28.46	$8.25	$12.70	$10.00	$0.00	$59.41
3	75.00	$30.50	$8.25	$12.70	$10.00	$0.00	$61.45

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: IRONWORKER/WELDER							
Effective Date: 3/16/2024							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
4 / 80.00		$32.53	$8.25	$12.70	$10.00	$0.00	$63.48
5 / 85.00		$34.56	$8.25	$12.70	$10.00	$0.00	$65.51
6 / 90.00		$36.59	$8.25	$12.70	$10.00	$0.00	$67.54
Apprentice to Journeyworker Ratio: 1:4							
JACKHAMMER & PAVING BREAKER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
LABORER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
Apprentice: LABORER							
Effective Date: 6/1/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 60.00		$22.20	$10.90	$9.75	$8.62	$0.00	$51.47
2 / 70.00		$25.90	$10.90	$9.75	$8.62	$0.00	$55.17
3 / 80.00		$29.60	$10.90	$9.75	$8.62	$0.00	$58.87
4 / 90.00		$33.30	$10.90	$9.75	$8.62	$0.00	$62.57
Apprentice: LABORER							
Effective Date: 12/7/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 60.00		$22.98	$10.90	$9.75	$8.62	$0.00	$52.25
2 / 70.00		$26.81	$10.90	$9.75	$8.62	$0.00	$56.08
3 / 80.00		$30.64	$10.90	$9.75	$8.62	$0.00	$59.91
4 / 90.00		$34.47	$10.90	$9.75	$8.62	$0.00	$63.74
Apprentice to Journeyworker Ratio: 1:5							
LABORER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$36.99	$10.90	$9.75	$6.60	$0.00	$64.24
	12/1/2026	$38.28	$10.90	$9.75	$6.60	$0.00	$65.53

Construction

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

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.19	$10.90	$9.75	$6.60	$0.00	$49.44
2	70.00	$25.89	$10.90	$9.75	$6.60	$0.00	$53.14
3	80.00	$29.59	$10.90	$9.75	$6.60	$0.00	$56.84
4	90.00	$33.29	$10.90	$9.75	$6.60	$0.00	$60.54

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.97	$10.90	$9.75	$6.60	$0.00	$50.22
2	70.00	$26.80	$10.90	$9.75	$6.60	$0.00	$54.05
3	80.00	$30.62	$10.90	$9.75	$6.60	$0.00	$57.87
4	90.00	$34.45	$10.90	$9.75	$6.60	$0.00	$61.70

Apprentice to Journeyworker Ratio: 1:5

LABORER: CARPENTER TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$36.92	$10.90	$9.75	$8.75	$0.00	$66.32
	12/7/2026	$38.22	$10.90	$9.75	$8.75	$0.00	$67.62
	6/7/2027	$39.62	$10.90	$9.75	$8.75	$0.00	$69.02
	12/6/2027	$41.02	$10.90	$9.75	$8.75	$0.00	$70.42
	6/5/2028	$42.52	$10.90	$9.75	$8.75	$0.00	$71.92
	12/4/2028	$44.02	$10.90	$9.75	$8.75	$0.00	$73.42
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$40.00	$10.90	$9.75	$8.62	$0.00	$69.27
	12/7/2026	$41.30	$10.90	$9.75	$8.62	$0.00	$70.57
	6/7/2027	$42.70	$10.90	$9.75	$8.62	$0.00	$71.97

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	12/6/2027	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
	6/5/2028	$45.60	$10.90	$9.75	$8.62	$0.00	$74.87
	12/4/2028	$47.10	$10.90	$9.75	$8.62	$0.00	$76.37

For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78

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

LABORER: MULTI-TRADE TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37

For apprentice rates see "Apprentice- LABORER"

LABORER: TREE REMOVER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37

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 LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62

For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78

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

MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	2/1/2026	$45.56	$12.84	$15.10	$5.41	$0.00	$78.91
	8/1/2026	$47.32	$12.84	$15.10	$5.41	$0.00	$80.67
	2/1/2027	$48.44	$12.84	$15.10	$5.41	$0.00	$81.79

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$22.78	$12.84	$15.10	$5.41	$0.00	$56.13
2	60.00	$27.34	$12.84	$15.10	$5.41	$0.00	$60.69

Construction

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

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
3	70.00	$31.89	$12.84	$15.10	$5.41	$0.00	$65.24
4	80.00	$36.45	$12.84	$15.10	$5.41	$0.00	$69.80
5	90.00	$41.00	$12.84	$15.10	$5.41	$0.00	$74.35

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.66	$12.84	$15.10	$5.41	$0.00	$57.01
2	60.00	$28.39	$12.84	$15.10	$5.41	$0.00	$61.74
3	70.00	$33.12	$12.84	$15.10	$5.41	$0.00	$66.47
4	80.00	$37.86	$12.84	$15.10	$5.41	$0.00	$71.21
5	90.00	$42.59	$12.84	$15.10	$5.41	$0.00	$75.94

Apprentice to Journeyworker Ratio: 1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANIC/WELDER/BOOM TRUCK OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 3) MILLWRIGHTS LOCAL 1121 MILLWRIGHTS LOCAL 1121 - Zone 3	1/5/2026	$45.20	$10.58	$11.47	$9.75	$0.00	$77.00

Apprentice: MILLWRIGHT (Zone 3)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$24.86	$10.58	$0.00	$5.36	$0.00	$40.80
2	65.00	$29.38	$10.58	$0.00	$6.34	$0.00	$46.30
3	75.00	$33.90	$10.58	$11.47	$7.31	$0.00	$63.26
4	85.00	$38.42	$10.58	$11.47	$8.29	$0.00	$68.76

Apprentice Notes

Step 1&2 Appr. indentured after 1/6/2020 receive no pension,

Apprentice to Journeyworker Ratio: 1:4

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
MORTAR MIXER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
OILER OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$35.02	$13.78	$12.15	$3.00	$0.00	$63.95
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS VI OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$32.74	$13.78	$12.15	$3.00	$0.00	$61.67
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$42.03	$10.35	$12.00	$8.35	$0.00	$72.73

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$21.02	$10.35	$0.00	$0.00	$0.00	$31.37
2	55.00	$23.12	$10.35	$0.00	$4.59	$0.00	$38.06
3	60.00	$25.22	$10.35	$0.00	$5.01	$0.00	$40.58

Construction

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

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
4	65.00	$27.32	$10.35	$0.00	$5.43	$0.00	$43.10
5	70.00	$29.42	$10.35	$12.00	$5.85	$0.00	$57.62
6	75.00	$31.52	$10.35	$12.00	$6.26	$0.00	$60.13
7	80.00	$33.62	$10.35	$12.00	$6.68	$0.00	$62.65
8	90.00	$37.83	$10.35	$12.00	$7.52	$0.00	$67.70

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$39.35	$10.35	$12.00	$8.35	$0.00	$70.05

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$19.68	$10.35	$0.00	$0.00	$0.00	$30.03
2	55.00	$21.64	$10.35	$0.00	$4.59	$0.00	$36.58
3	60.00	$23.61	$10.35	$0.00	$5.01	$0.00	$38.97
4	65.00	$25.58	$10.35	$0.00	$5.43	$0.00	$41.36
5	70.00	$27.55	$10.35	$12.00	$5.85	$0.00	$55.75
6	75.00	$29.51	$10.35	$12.00	$6.26	$0.00	$58.12
7	80.00	$31.48	$10.35	$12.00	$6.68	$0.00	$60.51
8	90.00	$35.42	$10.35	$12.00	$7.52	$0.00	$65.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$40.63	$10.35	$12.00	$8.35	$0.00	$71.33

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$20.32	$10.35	$0.00	$0.00	$0.00	$30.67
2	55.00	$22.35	$10.35	$0.00	$4.59	$0.00	$37.29
3	60.00	$24.38	$10.35	$0.00	$5.01	$0.00	$39.74
4	65.00	$26.41	$10.35	$0.00	$5.43	$0.00	$42.19
5	70.00	$28.44	$10.35	$12.00	$5.85	$0.00	$56.64
6	75.00	$30.47	$10.35	$12.00	$6.26	$0.00	$59.08
7	80.00	$32.50	$10.35	$12.00	$6.68	$0.00	$61.53

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PAINTER / TAPER (BRUSH, NEW) *							
Effective Date: 1/1/2026							
Step / Percent / Apprentice Base Wage							
8 / 90.00		$36.57	$10.35	$12.00	$7.52	$0.00	$66.44
Apprentice to Journeyworker Ratio: 1:1							
PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$37.95	$10.35	$12.00	$8.35	$0.00	$68.65
Apprentice: PAINTER / TAPER (BRUSH, REPAINT)							
Effective Date: 1/1/2026							
Step / Percent / Apprentice Base Wage							
1 / 50.00		$18.98	$10.35	$0.00	$0.00	$0.00	$29.33
2 / 55.00		$20.87	$10.35	$0.00	$4.59	$0.00	$35.81
3 / 60.00		$22.77	$10.35	$0.00	$5.01	$0.00	$38.13
4 / 65.00		$24.67	$10.35	$0.00	$5.43	$0.00	$40.45
5 / 70.00		$26.57	$10.35	$12.00	$5.85	$0.00	$54.77
6 / 75.00		$28.46	$10.35	$12.00	$6.26	$0.00	$57.07
7 / 80.00		$30.36	$10.35	$12.00	$6.68	$0.00	$59.39
8 / 90.00		$34.16	$10.35	$12.00	$7.52	$0.00	$64.03
Apprentice to Journeyworker Ratio: 1:1							
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$36.99	$10.90	$9.75	$6.60	$0.00	$64.24
	12/1/2026	$38.28	$10.90	$9.75	$6.60	$0.00	$65.53
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
Apprentice: PILE DRIVER							
Effective Date: 8/1/2024							
Step / Percent / Apprentice Base Wage							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PILE DRIVER							
Effective Date: 8/1/2024							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 45.00		$22.14	$10.08	$0.00	$2.53	$0.00	$34.75
2 / 55.00		$27.05	$10.08	$0.00	$5.07	$0.00	$42.20
3 / 70.00		$34.43	$10.08	$11.62	$7.60	$0.00	$63.73
4 / 80.00		$39.35	$10.08	$11.62	$10.14	$0.00	$71.19
Apprentice to Journeyworker Ratio: 1:5							
PIPELAYER	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
PIPELAYER (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
PLUMBER & PIPEFITTER	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
Apprentice: PLUMBER & PIPEFITTER							
Effective Date: 3/17/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 45.00		$23.74	$13.50	$10.85	$0.00	$0.00	$48.09
2 / 50.00		$26.38	$13.50	$10.85	$0.00	$0.00	$50.73
3 / 55.00		$29.02	$13.50	$10.85	$0.00	$0.00	$53.37
4 / 60.00		$31.66	$13.50	$10.85	$0.00	$0.00	$56.01
5 / 65.00		$34.29	$13.50	$10.85	$0.00	$0.00	$58.64
6 / 70.00		$36.93	$13.50	$10.85	$0.00	$0.00	$61.28
7 / 75.00		$39.57	$13.50	$10.85	$0.00	$0.00	$63.92
8 / 80.00		$42.21	$13.50	$10.85	$0.00	$0.00	$66.56
9 / 85.00		$44.85	$13.50	$10.85	$7.10	$0.00	$76.30
10 / 85.00		$44.85	$13.50	$10.85	$7.10	$0.00	$76.30

Construction

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

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 9/17/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$24.64	$13.50	$0.00	$0.00	$0.00	$38.14
2	50.00	$27.38	$13.50	$0.00	$0.00	$0.00	$40.88
3	55.00	$30.12	$13.50	$0.00	$0.00	$0.00	$43.62
4	60.00	$32.86	$13.50	$0.00	$0.00	$0.00	$46.36
5	65.00	$35.59	$13.50	$0.00	$0.00	$0.00	$49.09
6	70.00	$38.33	$13.50	$0.00	$0.00	$0.00	$51.83
7	75.00	$41.07	$13.50	$0.00	$0.00	$0.00	$54.57
8	80.00	$43.81	$13.50	$0.00	$0.00	$0.00	$57.31
9	85.00	$46.55	$13.50	$0.00	$7.10	$0.00	$67.15
10	85.00	$46.55	$13.50	$0.00	$7.10	$0.00	$67.15

Apprentice Notes

**1:1,2:5,3:9,4:12

Apprentice to Journeyworker Ratio: 1:1

PNEUMATIC CONTROLS (TEMP.) PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWDERMAN & BLASTER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$38.00	$10.90	$9.75	$8.62	$0.00	$67.27
	12/7/2026	$39.30	$10.90	$9.75	$8.62	$0.00	$68.57
	6/7/2027	$40.70	$10.90	$9.75	$8.62	$0.00	$69.97
	12/6/2027	$42.10	$10.90	$9.75	$8.62	$0.00	$71.37
	6/5/2028	$43.60	$10.90	$9.75	$8.62	$0.00	$72.87
	12/4/2028	$45.10	$10.90	$9.75	$8.62	$0.00	$74.37
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.99	$10.90	$9.75	$6.60	$0.00	$65.24
	12/1/2026	$39.28	$10.90	$9.75	$6.60	$0.00	$66.53
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER)	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER	5/1/2024	$26.14	$11.82	$7.25	$0.00	$0.00	$45.21
TEAMSTERS 404 - Construction Service (Northampton)							
TEAMSTERS 404 - Construction Service (Northampton)							
RIDE-ON MOTORIZED BUGGY OPERATOR	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
LABORERS	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
LABORERS - ZONE 3 (BUILDING & SITE)	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
ROLLER OPERATOR	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
ROOFER (Coal tar pitch)	10/2/2025	$44.73	$10.60	$8.70	$10.00	$0.00	$74.03
ROOFERS LOCAL 248	7/16/2026	$46.73	$10.60	$8.70	$10.00	$0.00	$76.03
ROOFERS LOCAL 248							
For apprentice rates see "Apprentice- ROOFER"							
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	10/2/2025	$44.23	$10.60	$8.70	$10.00	$0.00	$73.53
ROOFERS LOCAL 248	7/16/2026	$46.23	$10.60	$8.70	$10.00	$0.00	$75.53
ROOFERS LOCAL 248							
ROOFER SLATE / TILE / PRECAST CONCRETE	10/2/2025	$44.73	$10.60	$8.70	$10.00	$0.00	$74.03
ROOFERS LOCAL 248	7/16/2026	$46.73	$10.60	$8.70	$10.00	$0.00	$76.03
ROOFERS LOCAL 248							
For apprentice rates see "Apprentice- ROOFER"							
SCRAPER	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS)	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
SELF-PROPELLED POWER BROOM	12/1/2023	$35.80	$13.78	$12.15	$3.00	$0.00	$64.73
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
SHEETMETAL WORKERS LOCAL 63	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
SHEETMETAL WORKERS LOCAL 63	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28

Apprentice: SHEETMETAL WORKER

Effective Date: 7/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.57	$5.82	$4.95	$0.00	$0.85	$31.19
2	50.00	$21.74	$6.47	$5.51	$0.00	$0.94	$34.66
3	55.00	$23.91	$7.12	$9.91	$0.00	$1.15	$42.09
4	60.00	$26.09	$7.76	$9.91	$0.00	$1.23	$44.99
5	65.00	$28.26	$8.41	$9.91	$0.00	$1.31	$47.89
6	70.00	$30.44	$9.06	$9.91	$0.00	$1.39	$50.80
7	75.00	$32.61	$9.71	$9.91	$0.00	$1.47	$53.70
8	80.00	$34.78	$10.35	$9.91	$8.72	$1.78	$65.54
9	85.00	$36.96	$11.00	$9.91	$8.72	$1.86	$68.45
10	90.00	$39.13	$11.65	$9.91	$8.72	$1.94	$71.35

Apprentice: SHEETMETAL WORKER

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.57	$5.96	$4.95	$0.00	$0.85	$31.33
2	50.00	$21.74	$6.62	$5.51	$0.00	$0.94	$34.81
3	55.00	$23.91	$7.28	$9.91	$0.00	$1.15	$42.25
4	60.00	$26.09	$7.94	$9.91	$0.00	$1.23	$45.17
5	65.00	$28.26	$8.60	$9.91	$0.00	$1.31	$48.08
6	70.00	$30.44	$9.27	$9.91	$0.00	$1.39	$51.01
7	75.00	$32.61	$9.93	$9.91	$0.00	$1.47	$53.92
8	80.00	$34.78	$10.59	$9.91	$9.92	$1.78	$66.98
9	85.00	$36.96	$11.25	$9.91	$9.92	$1.86	$69.90
10	90.00	$39.13	$11.92	$9.91	$9.92	$1.94	$72.82

Apprentice to Journeyworker Ratio: 1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER	4/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
SPRINKLER FITTERS LOCAL 669	7/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
SPRINKLER FITTERS LOCAL 669	10/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
	1/1/2027	$56.54	$14.55	$7.50	$9.41	$0.00	$88.00
	4/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	7/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	10/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	1/1/2028	$59.83	$15.50	$7.55	$9.41	$0.00	$92.29

Apprentice: SPRINKLER FITTER

Effective Date: 4/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	43.00	$28.36	$9.64	$0.00	$0.00	$0.00	$38.00
2	48.00	$31.66	$9.64	$0.00	$0.00	$0.00	$41.30
3	52.00	$34.29	$13.60	$7.45	$1.15	$0.00	$56.49
4	56.00	$36.93	$13.60	$7.45	$1.15	$0.00	$59.13
5	59.00	$38.91	$13.60	$7.45	$1.40	$0.00	$61.36
6	64.00	$42.21	$13.60	$7.45	$1.40	$0.00	$64.66
7	68.00	$44.85	$13.60	$7.45	$1.40	$0.00	$67.30
8	72.00	$47.48	$13.60	$7.45	$1.40	$0.00	$69.93
9	76.00	$50.12	$13.60	$7.45	$1.40	$0.00	$72.57
10	80.00	$52.76	$13.60	$7.45	$1.40	$0.00	$75.21

Apprentice: SPRINKLER FITTER

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	43.00	$28.36	$9.64	$0.00	$0.00	$0.00	$38.00
2	48.00	$31.66	$9.64	$0.00	$0.00	$0.00	$41.30
3	52.00	$34.29	$13.60	$7.45	$1.15	$0.00	$56.49
4	56.00	$36.93	$13.60	$7.45	$1.15	$0.00	$59.13
5	59.00	$38.91	$13.60	$7.45	$1.40	$0.00	$61.36
6	64.00	$42.21	$13.60	$7.45	$1.40	$0.00	$64.66
7	68.00	$44.85	$13.60	$7.45	$1.40	$0.00	$67.30
8	72.00	$47.48	$13.60	$7.45	$1.40	$0.00	$69.93
9	76.00	$50.12	$13.60	$7.45	$1.40	$0.00	$72.57
10	80.00	$52.76	$13.60	$7.45	$1.40	$0.00	$75.21

Apprentice to Journeyworker Ratio: 1:1

TELECOMMUNICATION TECHNICIAN	12/28/2025	$53.26	$13.75	$8.40	$6.96	$0.00	$82.37
TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 7	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
ELECTRICIANS LOCAL 7	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37

For apprentice rates and ratios see "Apprentice- ELECTRICIAN"

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS	2/10/2026	$66.89	$12.84	$15.57	$8.02	$0.00	$103.32
BRICKLAYERS LOCAL 3	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92

Apprentice: TELECOMMUNICATION TECHNICIAN

Effective Date: 12/28/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.30	$7.65	$0.63	$0.00	$0.00	$29.58
2	45.00	$23.97	$7.65	$0.70	$0.00	$0.00	$32.32
3	50.00	$26.63	$13.75	$7.53	$0.00	$0.00	$47.91
4	55.00	$29.29	$13.75	$7.61	$0.00	$0.00	$50.65
5	65.00	$34.62	$13.75	$9.84	$0.00	$0.00	$58.21
6	70.00	$37.28	$13.75	$11.30	$0.00	$0.00	$62.33

Apprentice: TELECOMMUNICATION TECHNICIAN

Effective Date: 6/28/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.76	$7.80	$0.63	$0.00	$0.00	$30.19
2	45.00	$24.48	$7.80	$0.70	$0.00	$0.00	$32.98
3	50.00	$27.21	$14.00	$7.53	$0.00	$0.00	$48.74
4	55.00	$29.93	$14.00	$7.61	$0.00	$0.00	$51.54
5	65.00	$35.37	$14.00	$9.84	$0.00	$0.00	$59.21
6	70.00	$38.09	$14.00	$11.30	$0.00	$0.00	$63.39

Apprentice to Journeyworker Ratio: 1:1

Apprentice: TERRAZZO FINISHERS

Effective Date: 2/10/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$33.45	$12.84	$15.57	$8.02	$0.00	$69.88
2	60.00	$40.13	$12.84	$15.57	$8.02	$0.00	$76.56
3	70.00	$46.82	$12.84	$15.57	$8.02	$0.00	$83.25
4	80.00	$53.51	$12.84	$15.57	$8.02	$0.00	$89.94
5	90.00	$60.20	$12.84	$15.57	$8.02	$0.00	$96.63

Apprentice: TERRAZZO FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.55	$12.84	$15.57	$8.02	$0.00	$70.98
2	60.00	$41.45	$12.84	$15.57	$8.02	$0.00	$77.88

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TERRAZZO MECHANIC BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	2/1/2026	$67.97	$12.84	$15.57	$7.99	$0.00	$104.37
	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97

Apprentice: TERRAZZO FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
3	70.00	$48.36	$12.84	$15.57	$8.02	$0.00	$84.79
4	80.00	$55.27	$12.84	$15.57	$8.02	$0.00	$91.70
5	90.00	$62.18	$12.84	$15.57	$8.02	$0.00	$98.61

Apprentice to Journeyworker Ratio: 1:5

Apprentice: TERRAZZO MECHANIC

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$33.99	$12.84	$15.57	$7.99	$0.00	$70.39
2	60.00	$40.78	$12.84	$15.57	$7.99	$0.00	$77.18
3	70.00	$47.58	$12.84	$15.57	$7.99	$0.00	$83.98
4	80.00	$54.38	$12.84	$15.57	$7.99	$0.00	$90.78
5	90.00	$61.17	$12.84	$15.57	$7.99	$0.00	$97.57

Apprentice: TERRAZZO MECHANIC

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.09	$12.84	$15.57	$7.99	$0.00	$71.49
2	60.00	$42.10	$12.84	$15.57	$7.99	$0.00	$78.50
3	70.00	$49.12	$12.84	$15.57	$7.99	$0.00	$85.52
4	80.00	$56.14	$12.84	$15.57	$7.99	$0.00	$92.54
5	90.00	$63.15	$12.84	$15.57	$7.99	$0.00	$99.55

Apprentice to Journeyworker Ratio: 1:5

TEST BORING DRILLER LABORERS LABORERS - FOUNDATION AND MARINE	6/1/2026	$53.25	$10.90	$9.75	$9.80	$0.00	$83.70
	12/1/2026	$54.75	$10.90	$9.75	$9.80	$0.00	$85.20

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER LABORERS LABORERS - FOUNDATION AND MARINE	6/1/2026	$49.37	$10.90	$9.75	$9.80	$0.00	$79.82
	12/1/2026	$50.87	$10.90	$9.75	$9.80	$0.00	$81.32

For apprentice rates see "Apprentice- LABORER"

TEST BORING LABORER LABORERS	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
TRACTORS	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	6/1/2026	$61.48	$10.90	$9.75	$10.25	$0.00	$92.38
LABORERS	12/1/2026	$62.98	$10.90	$9.75	$10.25	$0.00	$93.88
LABORERS (COMPRESSED AIR)							
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	6/1/2026	$63.48	$10.90	$9.75	$10.25	$0.00	$94.38
LABORERS	12/1/2026	$64.98	$10.90	$9.75	$10.25	$0.00	$95.88
LABORERS (COMPRESSED AIR)							
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	6/1/2026	$53.55	$10.90	$9.75	$10.25	$0.00	$84.45
LABORERS	12/1/2026	$55.05	$10.90	$9.75	$10.25	$0.00	$85.95
LABORERS (FREE AIR TUNNEL)							
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR (HAZ. WASTE)	6/1/2026	$55.55	$10.90	$9.75	$10.25	$0.00	$86.45
LABORERS	12/1/2026	$57.05	$10.90	$9.75	$10.25	$0.00	$87.95
LABORERS (FREE AIR TUNNEL)							
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
WAGON DRILL OPERATOR	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
LABORERS	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
LABORERS - ZONE 3 (BUILDING & SITE)	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
LABORERS	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
LABORERS - ZONE 3 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WATER METER INSTALLER	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
PLUMBERS & PIPEFITTERS LOCAL 104	9/17/2026	$56.26	$12.00	$10.85	$7.10	$0.00	$86.21
PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21

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

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$44.67	$8.00	$12.55	$0.00	$0.00	$65.22
GROUNDMAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$30.58	$8.00	$5.48	$0.00	$0.00	$44.06
GROUNDMAN / TRUCK DRIVER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$39.97	$8.00	$10.96	$0.00	$0.00	$58.93
HEAVY EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$47.01	$8.00	$13.22	$0.00	$0.00	$68.23
JOURNEYMAN LINEMAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	9/1/2019	$51.71	$8.00	$15.55	$0.00	$0.00	$75.26

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 9/1/2019

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$31.03	$8.00	$3.43	$0.00	$0.00	$42.46
2	65.00	$33.61	$8.00	$3.51	$0.00	$0.00	$45.12
3	70.00	$36.20	$8.00	$3.59	$0.00	$0.00	$47.79
4	75.00	$38.78	$8.00	$5.16	$0.00	$0.00	$51.94
5	80.00	$41.37	$8.00	$5.24	$0.00	$0.00	$54.61
6	85.00	$43.95	$8.00	$5.32	$0.00	$0.00	$57.27
7	90.00	$46.54	$8.00	$7.40	$0.00	$0.00	$61.94

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$30.73	$4.70	$0.92	$2.25	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TRACTOR-TRAILER DRIVER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	9/1/2019	$44.67	$8.00	$12.55	$0.00	$0.00	$65.22

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42							

Additional Apprentice Information

All apprentices must be registered with the Division of Apprenticeship Training(DAS) in accordance with M.G.L.c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L.c. 149, §§ 26-27D.

Apprentice ratios are established by DAS pursuant to M.G.L.c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements(CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate.

Parties having questions regarding what ratio to use should contact DAS.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Time of Completion.
5. Work under separate contracts.
6. Access to site.
7. Contractor use of premises.
8. Work restrictions.
9. Specification and drawing conventions.
10. Miscellaneous provisions.

1.3 PROJECT INFORMATION

Project Identification: Pioneer Valley Transit Authority (PVTA) Paratransit Vehicle Charger Project

A.

1. Project Location: 2840 Main Street, Springfield, MA 01107

2. Owner: Pioneer Valley Transit Authority (PVTA).

B. Architect: STV Incorporated

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The Pioneer Valley Transit Authority (PVTA) Paratransit Vehicle Charger Project includes the installation of level 2 vehicle chargers along the exterior of the paratransit van storage building. The chargers will be powered from the existing switchgear in the maintenance and operations building about 150’ from the location of the new chargers installation.

B. Type of Contract:

1. Project will be constructed under a MGL Chapter 149 lump sum single prime contract.

1.5 TIME OF COMPLETION

A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time of 140 days. All work shall be substantially complete in 120 days from Notice to Proceed.

1.6 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 CONTRACTORS USE OF PREMISE

A. General: Contractor's use of Project site is limited only by Owner's operations. Buildings will be occupied by the Owner during construction. Contractor to coordinate all work with Owner.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to areas of disturbance as required by contract documents.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

B. On-Site Work Hours: Limit work on the site according to requirements of authorities having jurisdiction.

C. Existing Utility Interruptions: Do not interrupt utilities unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than two weeks in advance of proposed utility interruptions.
2. Obtain Architect and Owner written permission before proceeding with utility interruptions.

D. Nonsmoking Building: Smoking is not permitted on the project site at any time. There will be no exceptions.

E. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

H. The Contractor shall coordinate all work to be performed with the PVTA Bus operations staff. This is SATCO at the site. The contractor shall notify the Operations staff of the intended downtime dates of the bus washers and any other portion of the facility so the Operations staff can modify their daily operation and coordinate the use of the facility and site with the contractor. These dates and downtime shall be clearly identified in the contractor’s schedule.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents are abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.10 MISCELLANEOUS PROVISIONS

A. Copies of Drawings and Project Manuals: The Contractor is required to obtain the number of copies of the Drawings and Project Manual it requires for construction of the project. The Owner will not reimburse the Contractor for these copies.

B. Licensed Contractors/Subcontractors: All Subcontractors must be licensed to work in Hampden County, Massachusetts in each of their perspective fields of work on the Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 14 calendar days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

    a. Application for Payment forms with continuation sheets.
    b. Submittal schedule.
    c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub schedules showing values coordinated with each element.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

    a. Provide Davis Bacon Wages payrolls and certifications.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. Provide evidence of insurance.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Retainage

    a. In the construction phase of this contract a 5% retainage will be withheld from each payment of invoice until the maximum retained amount equals five (5) percent of the total GMP.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Architect on date specified by Owner of each month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance and evidence of transfer of title to Owner, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of values.
4. Contractor's construction schedule (preliminary if not final).
5. Products list (preliminary if not final).
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. Davis Bacon Wages and Commonwealth of MA Prevailing Wage Rates payrolls and certification.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.
13. Performance and payment bonds.
14. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. AIA Document G707A, “Consent of Surety to Final Reduction in or Partial Release of Retainage.”
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Requests for Information (RFIs).
3. Project meetings.

B. Each contractor shall cooperate and participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Description of work to be performed.

B. Key Personnel Names: Within 21 calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including, office, and cellular telephone numbers and e-mail addresses. Provide names and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.
2. Provide resumes of management personnel including dates of employment and project lists. The resumes of management personnel will be subject to the Owner's approval. The Owner reserves the right to remove individuals from the Project.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. Architect will not review RFI’s submitted via fax or verbal requests.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Form provided by the Architect..

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five business days for Architect's response for each RFI. Architect will review each RFI determine action required and respond. Allow five business days for Architect’s response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following business day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.

e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 business days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five business days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Where indicated, the contractor shall schedule and conduct [meetings and conferences at Project site unless otherwise indicated.

1. Attendees: The Contractor shall inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: The Contractor Construction Manager shall prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: The Contractor shall be responsible for conducting meeting and will record significant discussions and agreements achieved. The Contractor shall distribute the meeting minutes to everyone concerned, including Owner**,** and Architect, within three business days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 business days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner**,** Owner's Commissioning Authority, if applicable Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises and existing building.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: The General Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. Preinstallation conferences shall include conferences identified in individual Specification Sections.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and

installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority if applicable of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility requirements.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: The General Contractor shall schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 calendar days prior to the scheduled date of Substantial Completion.

1. Contractor shall conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority if applicable, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for preparing operations and maintenance data.
    e. Requirements for delivery of material samples, attic stock, and spare parts.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Coordination of separate contracts.
    k. Owner's partial occupancy requirements.
    l. Installation of Owner's furniture, fixtures, and equipment.
    m. Responsibility for removing temporary facilities and controls.

4. Minutes: Contractor shall record and distribute meeting minutes.

E. Progress Meetings: Architect will conduct progress meetings at biweekly intervals minimally.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, if applicable, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Three week look-ahead schedule.
        2) Interface requirements.
        3) Sequence of operations.
        4) Status of submittals.
        5) Deliveries.
        6) Off-site fabrication.

7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: The Architect shall record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Contractor shall conduct Project coordination meetings at weekly intervals, minimally. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority if applicable, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.

5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

Contractor RFI No.: _____ **DATE:** _____

TITLE: _____ **JOB:** _____

PROJECT: *Pioneer Valley Transit Authority*
Paratransit Vehicle Charger Project

REQUIRED: _____

TO: STV Incorporated
One Financial Center, Boston, MA 02110

ATTN:

QUESTION:

ANSWER:

Note: the response to this RFI is for clarification of the contract documents. The response is **NOT** authorization to procede with additional work.

Answered By:_____ Date:_____

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including but not limited to, the following:

1. Preliminary construction schedule.
2. Contractor's construction schedule.
3. Submittal schedule.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Qualification Data for Scheduling Consultant: For consultant or in-house persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Preliminary construction schedule.

1. Approval of startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

D. Submittals Schedule: Submit submittals schedule, conforming to dates on the Contractor's Construction Schedule. Include any required submittals not included on the schedule. Arrange the following information in a tabular format:

1. Scheduled dates for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational)
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's and Owner's final release or approval.

E. Contractor's Construction Schedule: Submit on 11"x17" paper for review as required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

F. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.

G. Daily Construction Reports: Submit at weekly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

K. Three Week Look-Ahead Schedules: Submit at weekly intervals.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination" review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required per construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit within 10 business days of Notice to Proceed. Include submittals required during the first 60 calendar days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule. Update monthly as required.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date(s) shall not be changed by submission of a schedule that shows a late completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Include the following:

1. Activity Duration
2. Procurement Activities
3. Submittal Review Time
4. Startup and Testing Time
5. Commissioning
6. Substantial Completion
7. Punch List and Final Completion

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date as provided or as indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date as provided or as indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing adjacent construction.
    b. Uninterruptible services.
    c. Use of premises restrictions.
    d. Provisions for future construction.
    e. Seasonal variations.
    f. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.
    n. Commissioning

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.
    d. Completion of mechanical installation.
    e. Completion of electrical installation.
    f. Substantial Completion.
    g. Final Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion and the following interim milestones:

1. Temporary enclosure and space conditioning.

E. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by

which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within 30 calendar days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 calendar days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 calendar days after date established for the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Startup Testing and commissioning.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.

2.6 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests, commissioning, and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.
20. Locations of Work.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.7 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain

of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

C. Three Week Look-Ahead Schedules: Contractor will submit a 3 week look-ahead schedule each week on a specific day of the week to be determined at the Preconstruction meeting. Each schedule will show specific work activities over that 3 week period and also areas of coordination required with other contractors and involved entities. These schedules will also show delivery dates of critical material or equipment items.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Owner with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

D. Preconstruction Photographs: Before commencement of excavation, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.
2. Take 40 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 40 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take 40 photographs monthly, with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Final Completion Construction Photographs: Take 100 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

G. Additional Photographs: Architect may request photographs in addition to periodic photographs specified.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to clarify Contractor's "Request for Information."
d. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
e. Substantial Completion of a major phase or component of the Work.
f. Owner's request for special publicity photographs.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples and other submittals.

B. Related Requirements:

1. Section 01300 “Construction Progress Documentation” for submitting schedules and reports, including Contractors construction schedules.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information, and physical samples that require Architect’s responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information, and physical samples that do not require Architect’s responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard for electronic documents, licensed by Adobe Systems, used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

E. Cloud-Based Construction Management Software Application (CMSA): Any of a number of proprietary file management collaborative systems intended for internet-connected device use. The intent of these applications is to enable dispersed users access to shared documents for storage, organization, retrieval, editing, tracking, reporting or other functions, with such access usually controlled by invitation and security protocols. More than one such application type or specific programs may be used, depending on Owner preferences.

1. Project preferred CMSA: Procore.

1.4 SUBMITTAL PROCEDURES

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project Record Drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Digital Drawing Software Program: The Contract Drawings are available in an AutoCAD format. Contact Architect to determine exact format available for each discipline.
c. Contractor shall execute a data licensing agreement in the form included in Project Manual.

1) To request electronic files, complete “Request Form for Electronic Files”.
2) Include “Processing Fee” in amount as indicated jn section 013100 “Project Management and Coordination”.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Identify long lead time submittals and products early on and notify Owner and Architect. Plan this into the submittal and delivery process.
3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserve(s) the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence upon Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 10 additional business days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 business days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
6. Transmittal for Sample Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor. Transmit each submittal using the transmittal form at the end of this section.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner and Architect , containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification Section number and title.
    j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number, numbered consecutively.

p. Submittal and transmittal distribution record.
q. Other necessary identification.
r. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp[s].

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp[s].

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Color charts showing full range of available colors.
d. Manufacturer catalog cuts.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Mill reports.
i. Standard product operating and maintenance manuals.
j. Compliance with recognized trade association standards.
k. Compliance with recognized testing agency standards.
l. Application of testing agency labels and seals.
m. Notation of coordination requirements.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shop work manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than sheet size used for Contract Document Drawings.
4. Number of Copies: Submit two black-line prints and one electronic file copy of each submittal. Architect will return the one print marked with action taken to the Contractor for distribution. Contractor shall make necessary copies from the returned print.

D. Samples: Prepare physical units of materials or products, including the following:

1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
    a. Generic description of Sample.
    b. Product name or name of manufacturer.
    c. Sample source.
4. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
    a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
    b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation, and similar construction characteristics.
5. Number of Samples for Initial Selection: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one submittal with options selected.
6. Number of Samples for Verification: Submit two full sets of Samples. Architect will retain one Sample set; remainder will be returned marked with action taken to the Contractor for distribution.
    a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
7. Disposition: Contractor to maintain one set of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

E. Submittals requiring compliance with other sections in the Project Manual.

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Application for Payment.

4. Schedule of Values.
5. Subcontract List.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections and elsewhere in the Contract Documents.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies, unless they are rejected for noncompliance with the Contract Documents.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before

installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

Q. Manufacturers Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

S. Material Safety Data Sheets: Keep on site and submit information directly to Owner. If submitted to Architect, Architect will not review this information but will return it with no action taken.

2.3 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional licensed in the jurisdiction of the Project for each product, assembly or system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date

of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Architect’s Action:

a. Final Unrestricted Release: When the Architect marks a submittal “No Exceptions Taken” the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
b. Final-But-Restricted Release: When the Architect marks a submittal “Provide as Corrected,” the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
c. Returned for Resubmittal: When the Architect marks a submittal “Revise and Resubmit,” do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay.

1) Do not use, or allow others to use, submittals marked “Revise and Resubmit” at the Project Site or elsewhere where Work is in progress.

d. Returned for Resubmittal: When the Architect marks a submittal “Rejected”, the Architect has not completed a full review, because it is clear that the submittal does not reflect the requirements of the Contract Documents. Do not proceed with work covered by the submittal, including purchasing, fabrication, delivery or other activity. Revise or prepare a new submittal that complies with the Contract Documents.
e. Other Action: If the submittal is primarily for information purposes, record purposes, special processing, or other contractor activity, the submittal will be returned marked “Reviewed for General Conformance Only”. These submittals have been received and processed for information only and not approved or disapproved by the architect.

C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with Contract Document requirements.
D. Submittals not required by the Contract Documents will not be reviewed and will be discarded or returned without action.

END OF SECTION 013300

Pioneer Valley Transit Authority (PVTA)
Springfield Paratransit Vehicle Charger Project
STV Project No. 3023168

June 2026
Issued for Construction

PROJECT: Bus Washer Replacement and Rehabilitation PROJECT #: **4020932**

OWNER: Pioneer Valley Transit Authority (PVTA) A/E: STV Incorporated

CONTRACT # & NAME

CONTRACTOR:
(NAME, ADDRESS, TELEPHONE & FAX NUMBERS)

☐ NEW SUBMITTAL ☐ RESUBMITTAL Date:

This submittal is: ☐ AS SPECIFIED REMARKS:

NUMBER OF COPIES SUBMITTED: (8 maximum)

TYPE OF SUBMITTAL: ***(CHECK ALL THAT APPLY)***

( ) SHOP DRAWINGS
( ) SAMPLE
( ) COLOR SELECTION
( ) SCHEDULE
( ) WARRANTY
( ) TEST REPORT
( ) PRODUCT DATA/CATALOG CUT
( ) RECORD DOCUMENT
( ) PERFORMANCE DATA
( ) OPERATIONS & MAINTENANCE DATA
( ) OTHER

SPEC. SECTION:

PARAGRAPH(S):

DWG. REF. NO.:

CONTRACTOR CERTIFICATION

CONTRACTOR CERTIFIES THAT THE INFORMATION SUBMITTED COMPLIES WITH THE CONTRACT DOCUMENT REQUIREMENTS.

By:

Date:

NOTE: Contractor shall apply an approval stamp to each copy of each submittal.

DESCRIPTION OF SUBMITTAL:

PRODUCT NAME:

MANUFACTURER:

ADDRESS: TEL. NO.:

CONTRACTOR or SUBCONTRACTOR: TEL. NO.:

SUPPLIER: TEL. NO.:

SECTION 013543 - ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 – GENERAL REQUIREMENTS that are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. For the purpose of this Section, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health, welfare or the environment.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of runoff, dust, noise, and solid waste, as well as other pollutants. Work shall include installing, maintaining, and removing sedimentation and erosion control components within the Limits of Work.

1.3 SECTION INCLUDES

A. Applicable Regulations.

B. Notifications.

C. Protection of Groundwater.

D. Protection of Streams And Wetlands.

E. Protection of Land Resources.

F. Protection of Air Quality.

G. Maintenance of Pollution Control Facilities During Construction.

H. Noise Control.

I. Diesel Equipment Emission Controls.

J. Spill And Discharge Control.

1.4 RELATED SECTIONS

A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

B. Section 015716 - TEMPORARY PEST CONTROL.

C. Section 024100 - DEMOLITION.

D. Section 311000 - SITE CLEARING.

E. Section 312000 - EARTH MOVING.

F. Section 312500 - EROSION AND SEDIMENTATION CONTROLS.

1.5 APPLICABLE REGULATIONS

A. The Contractor shall comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

B. Fines and related costs resulting from failure to provide adequate protection against any environmentally objectionable acts and corrective action to be taken are the obligations of the Contractor.

1.6 NOTIFICATIONS

A. PVTA may notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements may notify the Contractor in writing, through PVTA, of any non-compliance with State or local requirements. After receipt of such notice from PVTA or from the regulatory agency through PVTA, the Contractor shall immediately take corrective action. Such notice, when delivered to the Contractor or his/her authorized representative at the site of the Work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, PVTA may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

PART 2 - PRODUCTS

2.1 WATER

A. Water used for dust control and equipment washes shall be clean and free of salt, oil, and other injurious materials. The Contractor shall provide all necessary water.

2.2 ONSITE SPILL KIT

A. The Contractor shall provide the following minimum equipment to be kept onsite at all times during site work activities for any unexpected spills or discharges:

1. Sand, clean fill and absorbent pillows,
2. Four drums (55 gallon, U.S. DOT 17-E or 17-H),
3. Shovels, and
4. Steam cleaner for decontamination of tools and equipment.

PART 3 - EXECUTION

3.1 PROTECTION OF GROUNDWATER

A. Care shall be taken to prevent, or reduce to a minimum, any discharges to the ground of liquids that may infiltrate to the underlying groundwater or enter on-site waterways. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the groundwater or waterway shall not be discharged from the Site. Such waters shall be collected and disposed of by the Contractor in accordance with all applicable laws.

3.2 PROTECTION OF STREAMS AND WETLANDS

A. Care shall be taken to prevent, or reduce to a minimum, any damage to any wetland from pollution by debris, sediment, or other material. Manipulation of equipment and/or materials in delineated wetland areas is prohibited. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in downstream waters of the State, shall not be discharged from the Site. Such waters shall be collected and disposed of by the Contractor in accordance with all applicable laws.

3.3 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of remediation activities that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to Limits of Work areas shown on the Drawing.

B. Outside of the Limits of Work as shown on the Drawing, do not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. Snow fence or other approved equal shall be erected at the “fall line” of the tree canopy, and no vehicles or storage will be permitted within, to prevent damage to trees.

C. The locations of storage and other facilities, required in the performance of the Work, shall not be within wetlands or resource areas.

3.4 PROTECTION OF AIR QUALITY

A. Burning – The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control – Maintain all demolition excavations, stockpiles, waste areas, and all other work areas within or without the project boundaries free from dust which could cause regulatory standards for air pollution to be exceeded or cause a hazard or nuisance to others.

C. The Contractor shall provide adequate means for the purpose of preventing dust and odor caused by construction operations throughout the period of the construction contract. If PVTA or the Designer indicates that the level of dust or odors is unacceptable, the Contractor shall employ measures necessary to reduce dust or odors to an acceptable level.

D. The Contractor shall implement engineering controls (e.g. watering, misting) to control dust whenever required by the Designer or PVTA.

3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution, erosion, and sedimentation control as long as the operations creating the particular pollutant are being carried out.

3.6 NOISE CONTROL

A. The Contractor shall develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum. Local noise ordinances shall govern.

B. The Contractor shall execute construction work by methods and by use of equipment which will reduce excess noise.

C. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with applicable laws.

D. The Contractor shall manage vehicular traffic and scheduling to reduce noise.

3.7 SPILL AND DISCHARGE CONTROL

A. The Contractor shall provide equipment and personnel to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. The collected spill material shall be properly disposed of in accordance with applicable laws at the Contractor's expense.

B. Costs to provide the above spill and discharge control materials shall be included in the contract base bid price.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Experienced: Unless otherwise indicated in individual Specification sections, when used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 REPORTS AND DOCUMENTS

A. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect or Owner Construction Manager. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

J. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. UMass Standards: For all work on the UMass Campus, including the PVTA's building where this project is located, the contractor shall follow the University's standards. The can found online at https://www.umass.edu/dcm/design-guidelines.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations.

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations and return to original configuration upon completion of construction.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations and return to original configuration upon completion of construction.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Not Used.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

    a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service:

1. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Permanent Roads and Paved Areas: Maintain existing roads and paved areas adequate for construction operations.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated, or if not indicated, provide 4 foot by 8 foot sign comprised of ¾ inch exterior grade plywood mounted on 4 x 4 preservative treated wood posts set 4 feet into the ground. Sign content and layout as directed by Architect. Submit shop drawings for approval prior to fabrication and installation.
2. Prepare temporary signs to provide directional information to construction personnel and visitors.
3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
5. Maintain and touchup signs so they are legible at all times.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

F. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.

G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project, product delivery, storage, handling, manufacturers' standard warranties on products, special warranties and comparable products.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system" and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged, reused or repurposed from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance and other characteristics that are equivalent or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis of design" or “basis of design product" including make, model number or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance and other characteristics for purposes of evaluating comparable products of additional manufacturersnamed in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 business days of receipt of request, or five business days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 Submittal Procedures.
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis of Design Product Specification Submittal: Comply with requirements in Section 013300 Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, and with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment by covering construction.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage, and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location and security procedures with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 Closeout Procedures.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, and that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Correction of work.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.

5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underslab utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as

practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Maintain and clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls".

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 business days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 business days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 business days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 business days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Contractor shall prepare Punch List to include the following: name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 business days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas using a motorized mechanical sweeper. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls."

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.

6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of electric snow melt system, fluid hose reels, fluid management system, bus washers and heating devices.
2. Training in operation and maintenance of electric snow melt system, fluid hose reels, fluid management system, bus washers and heating devices.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within ten days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Contractor.
e. Date of video recording.

2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. Operating standards.
   b. Equipment function.
   c. Operating characteristics.
   d. Limiting conditions.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
   g. Include name and contact information for each equipment manufacturers installed products.

4. Operations: Include the following, as applicable:

   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Safety procedures.
   f. Instructions on stopping.
   g. Normal shutdown instructions.
   h. Operating procedures for emergencies.
   i.

j. Seasonal and weekend operating instructions.
k. Required sequences for electric or electronic systems.
l. Special operating instructions and procedures.

5. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

6. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

7. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner**,** through Architect, with at least fourteen days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.

c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 11 11 36

COMMERCIAL ELECTRIC VEHICLE CHARGING UNIT - LEVEL 2

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included: This Section specifies furnishing and installing EV charging equipment to provide a complete Level 2 EV charging system.

B. Alternates

1. Alternate 1 -Level 2 Vehicle Chargers

C. Related Section:

1. Section 260502 - BASIC MATERIALS AND METHODS FOR ELECTRICAL WORK
2. Section 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
3. Section 260526 – GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

1.2 DEFINITIONS

A. EV: Electric vehicle.

B. EV Cable: The off-board cable containing the conductor(s) to connect the EV power controller to the EV that provides both power and communications during energy transfer.

C. EV Capable: Parking spaces that include nearby termination of raceway (conduit) to a power source with sufficient electrical panel capacity designed for simultaneous charging of electric vehicles in all planned EV parking spaces. Electrical wiring need not be pulled through raceway (conduit) until charging station is installed.

D. EV Charger or EV Charging Equipment: See "EVSE".

E. EV Connector: A conductive device that, when electrically coupled to an EV inlet, establishes an electrical connection to the EV for the purpose of power transfer and information exchange. This device is part of the EV coupler.

F. EV Coupler: A mating EV inlet and connector set.

G. EV Inlet: The device in the vehicle into which the EV connector is inserted, and a conductive connection is made for the transfer of power and communication. This device is part of the EV coupler.

H. H.EV Make Ready: Parking spaces that include nearby termination of raceway (conduit) and electrical wiring pulled to a power source with sufficient electrical panel capacity for simultaneous charging of electric vehicles in all EV parking spaces.

I. EVSE: Electric Vehicle Supply Equipment. It includes the EV charging equipment and conductors, including the ungrounded, grounded, and equipment grounding conductors and EV cables, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for transferring energy between the premise wiring and the EV.

1.3 PREINSTALLATION MEETINGS

A. A preinstallation conference shall be held at the PVTA Administration Facility located at 2808 Main Street. Springfield, MA.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for EV charging equipment.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals

1. Plan showing location and number of EV charging units and distance from building.
2. Plan showing "reasonable accessibility" to EV charging units.
3. Plan showing location and number of EV charging units, charging levels and connectors, and ability of EV charging units to participate in a demand-response or time-of-use pricing program, as well as a power load management system that allows for an increased number of charging stations than would otherwise be feasible without power load management.

C. Shop Drawings: For EV charging equipment.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of mounting assemblies for EV charging equipment.
4. Include diagrams for power, signal, and control wiring.
5. Include verification of wireless communications service at each location of EV charging equipment

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Area plans and details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which equipment will be attached.
2. Electrical Service.
3. Communications service, including wireless communications equipment.

B. Installer qualifications data.

C. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For EV charging equipment to include in operation and maintenance manuals.

B. As-Built Drawings. Submit prior to final acceptance of the work, drawings showing complete layout of systems installed including physical location of ground rods to which connections were made.

C. Software and Firmware Operational Documentation

1. Online training and help documentation.
2. Station activation sticker.

D. Field Quality Control Test Report. Submit reports complying with requirements of Section 3.5 "Field Quality Control".

E. Training

1. Develop training courses and materials for personnel engaged in each job function associated with the integrated operations and maintenance of the Charger.
2. Provide one - 8 hour course for four (4) PVTA personnel.
3. Furnish the services of a factory authorized training engineer(s) to provide complete training courses.
4. Instructor-led training shall include "hands-on" practice sessions for each participant.
5. Conduct training at a time convenient to and approved by PVTA. The times of the training shall be scheduled over a 24-hour period:
6. Submit dates and times for each course/session 60 days prior to the scheduled date of training, as indicated on the list of submittals.
7. Course Content
    a. Courses shall consist of the theory of operation, system capabilities, provisions for system expansion, implementing software updates, troubleshooting and proper field and shop maintenance procedures for systems furnished under this Contract. Manuals required under this section are in addition to Operation and Maintenance Manuals and electronic data files.
    b. Equipment provided for training courses shall be of the identical type approved for use under the Contract. It shall be furnished with all required cables, connectors, loaded software and related items. Equipment, manuals and other items furnished under this paragraph shall not be counted as part of any other equipment to be furnished under the Contract.
    c. Provide a sufficient number of training aids, portable working models, training manuals, equipment and any other materials required to assure that meaningful courses are taught. Quantities shall be sufficient to allow each student in the class to use within the allowed training course duration.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Electrical Components, Devices, and Accessories: UL Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Comply with UL 50E, UL 916, UL 2231-1. UL 2231-2, UL 2594, and NEC Article 625.

D. Comply with SAE J1772 standard for specialized connectors.

E. Comply with FCC Part 15 Class A.

1.8 WARRANTY

A. Manufacturer’s Warranty: Manufacturer and Installer agree to repair or replace components of EV charging units that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.9 FIELD CONDITIONS

A. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

B. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not exceeding minus 40 to plus 122 deg F.
2. Operating Humidity – up to 85% @ +50C (122F) non-condensing
3. Altitude: Not exceeding 6600 feet.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify the Authority no fewer than 7 days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Authorities written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis- of-Design Product: Provide ChargePoint CT6000 family of electric vehicle charging stations for all applications.

1. ChargePoint model CP6023B-80A-L7 – 80A Dual Port, pedestal / wall mount, 23 ft cable with cable management system

B. Source Limitations: Obtain EV charging equipment from single manufacturer.

2.2 EV CHARGING EQUIPMENT DESCRIPTION

A. Electrical Components, Devices, and Accessories: UL Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. ADA compliant.

D. Metering: +/- 2 percent from 2 percent to full scale of output (30 A).

E. EV Charging Equipment Mounting: Bollard mount

F. Enclosures:

1. Rated for environmental conditions at installed location.
   a. Indoor Locations: NEMA 250 and UL 50E, Type 3R.
   b. Outdoor Locations: NEMA 250 and UL 50E, Type 3R.
   c. Aluminum and UV-resistant plastic.
   d. Paint and Anodized.
   e. Charging components protected by security screws.
   f. Charging connectors in locking holsters.
   g. Meter, modem, and CPU, tamper resistant.

G. EV Cable and Connectors

1. SAE J1772 connector with Power Share capability.
2. Two connectors with locking holster.
3. 18-foot cable with cable management system (auto cable retraction).

H. Status Indicators:

1. LEDs to indicate power, vehicle charging, charging complete, system status, faults, and service, as well as authorization.

I. Display Screen:

1. VGA-resolution, daylight-viewable LCD screen with UV protection. Daylight readable and fingerprint resistant.
2. Displays power, charging, charging complete, remote control, system status, faults, payment and pricing details, and service.

J. Networking:

1. WAN Communications: Cellular GSM/GPRS and CDMA.
2. LAN Communications: 2.4 GHz Wi-Fi 802.11b/g/n.
3. Capable of remote configuration, diagnostics and reporting.
4. Capable of remote software updates (future proof).

K. Payment Control System:

1. Main Transaction by PVTA
   a. RFID (ISO 15693, ISO 14443), NFC, Contactless credit card reader.

L. Charging Network: Compatible with the ChargePoint EV charging network.

1. Multiple units shall independently connect to charging network.
2. Multiple units shall have one unit designated as a master unit that is configured as a gateway unit between the EV charging equipment and the charging network.
3. Individual units shall be capable of indicating station status and availability providing or connecting user to customer support and remote control.
4. Must have ability to limit access to the station by driver classification, with flexible options including Time of Day and Day of Week access.
5. Must support a queuing function, allowing drivers to join a virtual lineup and be served in the order that that joined.
6. Must support power management, including ability to intelligently oversubscribe the available infrastructure (at the circuit, panel, or site level).
7. Must have the ability to notify driver via text, email, or in-app, when charging is complete, if a charging session has been disrupted, or if the price is about to increase.
8. EVSE real-time status and availability must be available to drivers via mobile application and to station owner via secure website.
9. EVSE must provide local data storage in the event of a network communication failure. All data automatically uploaded when connectivity is restored. Must have sufficient storage to hold at least 30 days of offline data,
10. Must have ability to grant access to allow 3rd party data collection and/or administrative access to stations via secure web interface or API.
11. All data must be encrypted both in transit and at rest using industry accepted methods.
12. 13 For each charging session, EVSE must collect (minimally) station identifier, session start/stop times, total energy (kWh), session fee, active charging time, unique user ID (non-PII), 15-minute meter data.

2.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

B. Surge Withstand: 6kV @ 3000 A.

C. Integral GFCI.

D. Auto=GFCI fault retry.

E. Input Power:

1. [80A] [Two 80A], 208/240-V ac, 60 Hz, single phase per charger.
2. Dual circuits do not need to be interlocked.

F. EV Charging Levels:

1. Dual vehicles, AC Level 2 at up to 19.2 kW (CP6000) per vehicle.
2. Multiple vehicles simultaneously charging at a site using Automatic Power Load Management may be charged up to 19.2 kW.

2.4 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for EV charging equipment electrical conduit to verify actual locations of conduit connections before equipment installation.

C. Examine walls, floors, and pavement for suitable conditions where EV charging equipment will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 413.

B. Wall Mounting:

1. Install EV charging equipment so that its receptacles or holders are not less than 18 inches (450 mm) and not more than 4 feet (1.2 m) above finished floor.
2. Mount EV charging equipment to steel slotted supports [5/8 inch (16 mm)] [1-1/4 inches (32 mm)] in depth. Orient steel slotted supports vertically.
3. Ensure that EV charging equipment is plumb and rigid without distortion of box.
4. Secure EV charging equipment according to manufacturer's written instructions.
5. Protect EV charger with Wattz Up Wall Guard, steel wall bracket, model LA-1010 or approved equal.

C. Bollard Mounting

1. Allow a minimum of 24 inches (600 mm) of clearance around EV charging equipment.
2. EV charging equipment receptacles or holders shall be not less than 24 inches (600 mm) and not more than 4 feet (1.2 m) above finished grade.
3. Mount EV charging equipment plumb and rigid without distortion of enclosure.

4. Secure EV charging equipment according to manufacturer's written instructions.
5. Protect EV charger with Wattz Up Wall Guard, steel wall bracket, model LA-1010 or approved equal.

D. Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260502 "Basic Materials and Methods for Electrical Work."
2. Comply with requirements for underground raceways and enclosures specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems".

E. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

F. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

G. Secure covers to enclosure.

3.3 CONNECTIONS

A. Connect and installation of wiring and conduit according to Section 260502 "Basic Materials for Methods for Electrical Work."

B. Comply with grounding requirements in Section 260526 "Grounding and Bonding for Communications Systems".

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-486B.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification".

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform test and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections:

1. For each unit of EV charging equipment, perform the following tests and inspections:
   a. Unit self-test
   b. Operation test with load bank.

c. Operation test with EV.
d. Network communications test.

D. EV charging equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Engage a factory authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 TRAINING

1. Provide training in accordance with submittal and manufacturer's training program.

3.8 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for the duration of an active ChargePoint Network Service Plan.

B. Upgrade Service: At Substantial Completion, remotely update software to latest version. Install and program software upgrades that become available while an active ChargePoint Network Service Plan is maintained. Upgrading software shall include operating system and new or revised licenses for using software.

3.9 DEMONSTRATION

A. Utilize ChargePoint Station Management Services and ChargePoint Assure Services, or Train Owner's maintenance personnel to adjust, operate, and maintain EV charging equipment.

3.10 ONGOING MANAGEMENT SERVICES

A. Engage a station manufacturer that offers a service to manage the administration and policies of the electric vehicle charging stations on an ongoing basis.

PART 4 - MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Separate measurement and payment will not be made for the work of this Section. The cost for all work, complete in place; furnishing and installing all materials, equipment and accessories required; providing all tools, labor, transportation, handling and storage; and performing all work incidental to completion of work in this Section shall be included in the Contract Lump Sum Prices for the work.

END OF SECTION

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Examine all other Sections of the Specifications for requirements that affect work under this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Common electrical installation requirements.
3. Section includes surface preparation and application of high-performance coating systems on the following interior substrates:

    a. Unistrut Supports and System Components
    b. Miscellaneous items required for installation and exposed to view as outlined in this specification
    c. Bollards

1.3 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To avoid existing piping and conduit installed.
4. So connecting raceways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

1.4 HIGH PERFORMANCE COATING DEFINITIONS:

A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

B. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.5 HIGH PERFORMANCE COATING ACTION SUBMITTALS

A. Product Data: For each coating system indicated.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.

C. Samples for Initial Selection: Manufacturer’s color charts showing the full range of colors available for each type of finish-coat material indicated.

D. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

1. Provide stepped Samples defining each separate coat including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. List of material and application for each coat of each sample. Label each sample for location and application.
3. Submit samples on the following substrates for Architect's review of color and texture:

a. Ferrous and Nonferrous Metal: Provide two 4-inch (100-mm) square samples of flat metal and two 8-inch (200-mm) long samples of solid metal for each color and finish.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other specified information.

1.6 QUALITY ASSURANCE FOR HIGH PERFORMANCE COATING

A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Sample Areas:

1. Verify compatibility of primers, intermediate coats and topcoats with each other and with substrates prior to sample application. Verify that shop primers (if any) are as specified and/or appropriate for high performance coatings to be applied infield.

D. Workmanship shall be of the best quality. Apply all materials under adequate illumination, evenly spread and smoothly flowed on without runs or sags. Employ only skilled painters. Use materials only in accordance with the manufacturer's labeled directions on

E. the container, and/or manufacturer's other written instructions.

1.7 DELIVERY, STORAGE, AND HANDLING OF HIGH-PERFORMANCE COATING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

1. Name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45°F (7°C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect materials from freezing. 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 applying coatings.

C. Deliver coatings to the job site in quantities sufficiently large enough so that several different batches of the same color will not be required.

1.8 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50°F and 95°F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85%; at temperatures less than 5°F (3°C) above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL:

A. Acceptable Manufacturers:

1. The Sherwin Williams Company (SW)
2. Tnemec Company (TC)
3. Carboline (C)
4. Or equal.

B. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
3. Provide products of same manufacturer for each coat in a coating system

2.2 Acrylic Coatings

1. Basis of Design Color- SW7686 Zurich White
2. SW- Shercryl High Performance Acrylic 2-4 mils DFT or equal by other listed manufacturers.

2.3 METAL PRIMERS:

A. Primer, Zinc-Rich, Organic:

1. Urethane:

a. SW- Corothane I Galvapac Zinc at 3.0 – 4.0 mils DFT
b. TC- Series H90-97 Tneme Zinc at 2.5 – 3.5 mils DFT
c. C- Carbozinc 621 at 3.0 – 8.0 mils DFT

2.4 EPOXY COATINGS:

A. Basis of Design Color- SW7686 Zurich White

B. Solvent Based Epoxy:

1. SW- Macropoxy 646 at 3.0 – 10.0 mils DFT
2. TC- Series 69 at 2.0 – 10 mils DFT
3. C- Carboguard 888 at 4.0 – 6.0 mils DFT

2.5 URETHANE COATINGS:

A. Basis of Design Color- SW7686 Zurich White

B. Acrylic Polyurethane:

1. SW- Acrolon 218 at 3.0 – 6.0 mils DFT
2. TC- Series 72 Endurashield at 2.0 – 5.0 mils DFT
3. C- Carbothane 134 at 2.0 – 2.5 mils DFT

C. New Generation Acrylic Polyurethane

1. SW- Acrolon Ultra at 2.0 – 3.0 mils DFT
2. TC- Series 740 UVX at 2.5 – 5.0 mils DFT

D. Fluoropolymer:

1. Basis of Design Color- Safety Yellow at Bollards
2. SW- Fluorokem HS at 2.0-3.0 mils DFT
3. TC- Series 1071 Fluoronar at 2.0 – 3.0 mils DFT
4. C- Carboxane 950 at 2.0 – 3.0 mils DFT

2.6 SOURCE QUALITY CONTROL:

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. Right of Way: Give to piping systems installed at a required slope.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials must be approved for specific use.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.

C. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

D. Manufacturers:

1. 3m
2. Rockwool
3. Tremco
4. STI

3.3 HIGH-PERFORMANCE COATING

A. Applies to sections 260529 and 260533

B. Examine substrates and conditions, with Applicator present, for compliance with requirements for conditions affecting performance of the Work.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.4 HIGH PERFORMANCE COATING PREPARATION:

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions.

1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi (690 to 4140 kPa) at 6 to 12 inches (150 to 300 mm).

E. Steel Substrates: Remove rust and mill scale. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

F. Shop-Primed Steel Substrates: C l e a n field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized Substrates: Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 16 Brush off blast cleaning of nonferrous metals.

3.5 APPLICATION OF HIGH-PERFORMANCE COATING:

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture in the same or similar manner as exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

C. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.6 HIGH PERFORMANCE COATING CLEANING AND PROTECTION:

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.7 ONE-YEAR INSPECTION OF HIGH-PERFORMANCE COATING:

A. Owner will set date for one-year inspection of coating systems.

B. Repair deficiencies in coating systems as determined by Architect in accordance with manufacturers' instructions.

3.8 EXTERIOR AND INTERIOR – COATING SYSTEMS FOR STEEL:

C. All interior exposed unfinished bollards, unistrut, misc. steel fabrications exposed to view and conduits:

1. Organic Zinc Rich Primer/ Solvent Based Epoxy/ New Generation Acrylic Polyurethane

END OF SECTION 260500

SECTION 260502

BASIC ELECTRICAL MATERIALS & METHODS

(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

A. Unless otherwise modified, provisions of General Conditions, Supplementary Conditions and Division-01 govern work under the Electrical Divisions.

B. The drawings and specifications shall be followed in layout of work.

C. Contract Document Interpretation/Discrepancies:

1. Should the Contractor discover any discrepancies or omissions on the drawings or in the specifications, he shall notify the Architect/Engineer (A/E) of such conditions prior to the bid date. Otherwise, it will be understood that the drawings and specifications are clear as to what is intended and shall be as interpreted by the A/E.
2. In addition, should any contradiction, ambiguity, inconsistency, discrepancy or conflict appear in or between any of the Contract Documents, the Contractor, shall, before proceeding with the work in question, notify the A/E and request an interpretation. In no case shall he proceed with the affected work until advised by the A/E.
3. If the Contractor fails to make a request for interpretation of discrepancies or conflicts in the drawings or specifications, no excuse will be accepted for failure to carry out the work in a satisfactory manner, as interpreted by the A/E. In all cases, the Contractor will be deemed to have estimated the most stringent materials and methods (i.e. the highest quality materials and most expensive manner of completing the work) unless he has requested and obtained written authorization as to which methods or materials will be required.
4. Each and every trade or subcontractor will be deemed to have familiarized himself with all drawings of this project, including Site/Civil, Structural, Electrical, etc. so as to avoid coordination errors, omissions, and misinterpretations. No additional compensation will be authorized for alleged errors, omissions, and misinterpretation, whether they are a result of failure to observe these requirements or not.

D. The complete set of Structural, Civil and Electrical drawings and specifications apply to this work.

E. Filed Sub-Bid Requirements:

1. For the classes of work listed below, the Trade Contractor’s attention is directed to Massachusetts G.L. 149 Section 8(g)(6) and the Filed Sub-Bidder's Bid Form as amended, which provides in part as follows:

2. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the classes or part thereof of work for which the provisions of the section of the Specifications for this sub-trade require listing in this paragraph, including the undersigned if customarily furnished by persons on his own payroll, and in the absence of a customary provision in the Specifications, the name of each class of work or part thereof and the bid price for such class of work or part thereof are:

CLASS OF WORK	**REFERENCE SECTION**
Low-voltage Cables	260519, 2.01
Grounding & Bonding	260526, 2.01
Hangers & Supports	260529, 3.01
Raceways & Boxes	260533, 2.1, 2.2
Low-Voltage Transformers	262200, 2.3
Panelboards	262416, 2.01
Enclosed Switches & Circuit Breakers	262816, 2.01, 2.02
Lighting Fixtures	265600, 2.01
Fire Alarm System	269500, 1.11, 2.2, 2.3

3. Reference Drawings: The Work of this Trade Bid is shown on the following Contract Drawings:

NUMBER	SHEET NAME
E-001	ELECTRICAL LEGEND, NOTES, & ABBREVIATIONS
E-002	OVERALL SITE PLAN
E-101	ELECTRICAL POWER PLAN
E-401	ELECTRICAL VEHICLE CHARGER ENLARGED VIEWS
E-501	ELECTRICAL DETAIL PLAN
E-601	NEW ELECTRICAL ONELINE DIAGRAM
E-901	NEW ELECTRICAL SCHEDULE

1.02 DESCRIPTION

A. Unless otherwise modified in other Sections, or on the contract drawings, which define the scope and arrangement of the electrical work to be provided, the applicable provisions of these General Requirements shall govern the furnishing of all supervision, labor, equipment, tools, services, and materials necessary to install a complete electrical system ready for continuous and successful operation. The work shall include, but not be limited to, the furnishing and installation of the following items, as applicable:

1. Electrical services meeting the requirements of and in coordination

with the local electric power company. Refer to the latest edition of the local power company manuals and standards for service details.
2. Power panelboards, and all required overcurrent devices.
3. Automatic Transfer Switches (ATS), Manual Transfer Switches (MTS), and transformers.
4. Lighting and receptacle feeders and branch circuit wiring.
5. Lighting fixtures.

1.03 PERMITS, INSPECTION AND CERTIFICATION

A. Permits: Refer to the General Conditions of the Contract.

B. Inspections: Refer to the latest edition of the local power company manuals for service inspection requirements.

C. Certifications:

1. Certificates of final inspection and approval required by agencies or authorities having jurisdiction shall cover all electrical work.
2. All certificates of final inspection and approval shall be delivered to the Engineer prior to final acceptance of the electrical work.

1.04 CODES, STANDARDS AND REFERENCES

A. The electrical work covered under the specifications and drawings shall be performed in strict accordance with the latest adopted edition of the following codes and standards:

1. National Electrical Code (NEC), NFPA 70
2. Applicable codes and standards of the National Fire Protection Association (NFPA)
3. National Electrical Safety Code, ANSI C2
4. International Building Code (IBC)
5. All authorities having jurisdiction

B. The work covered under the specifications and drawings shall be performed using the following references as minimum standards for construction and testing:
1. American National Standard Institute (ANSI)
2. National Electrical Manufacturers' Association (NEMA)
3. Underwriter's Laboratories (UL)
4. The Occupational Safety and Health Act (OSHA)
5. InterNational Electrical Testing Association (NETA)
6. Applicable standards of the utility company and the telephone company
7. American Society of Testing Materials (ASTM)
8. Institute of Electrical and Electronic Engineers (IEEE)
9. Illuminating Engineering Society (IES)
10. Insulated Cable Engineers Association (ICEA)

C. Electrical construction materials shall, where a listing is normal for the

particular class of material, be listed in "Electrical Construction Material List" of the Underwriter's Laboratories, Inc. (UL) and shall bear the listing label. Electrical equipment shall, where a listing is normal for the particular class of equipment, be listed in the "Electrical Appliance and Utilization Equipment List" of the Underwriter's Laboratories, Inc. (UL) and shall bear the listing label. Materials and equipment listed and labeled as "approved for the purpose" by a Nationally Recognized Testing Laboratory (NRTL), inspection agency or approved organization shall be acceptable.

1.05 CLARIFICATION OF DRAWINGS

A. Should a bidder find discrepancies in or omissions from the drawings or specifications, or should he be in doubt in regard to their intent, the Contractor shall notify the Engineer before submitting bid proposal. The Engineer shall then send written instructions to all bidders.

1.06 SUBMITTALS, REVIEW AND ACCEPTANCE

A. Complete shop drawings and material lists shall be submitted by the Contractor for review by the Engineer in accordance with the requirements of the GENERAL PROVISIONS. Equipment and materials for which shop drawings are not submitted shall be provided as specified, and other manufacturers and products will not be allowed. No work shall be fabricated or ordered by the Contractor until approval has been given by the Engineer.

B. Complete shop drawings showing dimensions, materials, arrangements, and other pertinent data shall be submitted.

C. Complete lists of materials and equipment shall be submitted. Full description catalog or other data shall be submitted.

D. Shop drawings and material lists shall be submitted for, but not limited to the following:

1. Conduit
2. Wire
3. Boxes, Fittings, and Wire Troughs
4. Cabinets
5. Wiring Devices
6. Panelboards
7. Safety Switches
8. Low Voltage Fuses
9. Enclosed Circuit Breakers
10. Lighting Fixtures and Components
11. Motor Starters
12. Automatic Transfer Switches
13. Emergency Generator
14. Emergency Lighting Equipment
15. As elsewhere indicated on the drawings or in the specifications.

E. Submittals shall include but not be limited to the following information: Size, type, functional characteristics, compliance with standards, required service access which shall be suitable for intended location and use, electrical service connections and requirements, and deviations from Contract Document requirements.

F. Shop drawings shall include plans, elevations, sections, mounting details of component parts, point to point interconnection diagrams, elementary diagrams, single line diagrams, and any other drawings necessary to show the fabrication and connection of the complete item or system.

G. Submit shop drawings and/or diagrams for all specially fabricated items, modifications to standard items, specially designed systems where detailed design is not shown on the contract drawings or where the proposed installation differs from that shown on the contract drawings.

H. Submittals shall include Riser Diagrams and Schematic Wiring Diagrams, complete conduit and wire requirements, outlet and junction box sizes and power requirements, for the following systems:

1. Grounding Systems
2. As indicated elsewhere on the drawings or specifications.

I. Submit 1/4" (6 mm) or 1/2" (13 mm) scale plans showing layout of equipment in electrical equipment rooms and closets, etc., indicating sizes of equipment, dimensions, clearances, etc. based on equipment being installed.

J. Prepare and stamp each submittal in a form indicating that the documents have been contractor reviewed, are complete and are in compliance with the requirements of these contract drawings and specifications.

K. In general, catalog cuts, specification sheets, descriptive data, etc., shall be acceptable for submittal of all equipment specified by standard catalog numbers, unless otherwise noted in the construction documents.

L. Shop drawings shall be clearly legible; poor reproductions or reduced photographic copies that are not legible shall be rejected.

M. Before submission of shop drawings the Contractor shall carefully check same for proper capacity, operating characteristics, physical arrangement accessories, etc., as specified or noted on drawings. If shop drawings are submitted and indicate little or no prior checking by the Contractor, they shall be rejected.

N. Submittal Identifications:

1. Place a permanent label or title block on each submittal for identification.
2. Indicate name of firm or entity that prepared each submittal on label or title block.
3. Provide a space approximately 4 by 5 inches on label or beside title block to record contractor’s review and approval markings and action

taken by A/E.

4. Include the following information on label for processing and recording action taken:

   a. Project name
   b. Date
   c. Name and address of A/E
   d. Name and address of contractor
   e. Name and address of subcontractor
   f. Name and address of supplier
   g. Name of manufacturer
   h. Unique identifier, including revision number
   i. Number and title of appropriate specification section
   j. Drawing number and detail references, as appropriate
   k. Other necessary identification
      - Example: 16120-01-0
        - 16120 references the spec section
        - 01 indicates this is the first submittal from this spec section
        - 0 indicates this is the original submittal (where 1 would indicate this is the first re-submittal)

O. Submittals not in compliance with the requirements of this section will be returned without review.

P. The review of shop drawings will be general and shall not relieve the Contractor from sole responsibility for errors or omissions of any sort, nor for proper fitting and construction on work or the furnishing of materials or work required by the Contract Documents but not shown or indicated on the shop drawings. Approval shall not imply verification of required quantity of material, nor correctness of dimensions. Requests by the Owner's Representative for changes and corrections on shop drawings shall not be construed as an order for extra work under the contract.

Q. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish the named item, or equivalent, subject to acceptance. Suitability of only the named item has been verified. Where more than one item is named, only the first named item has been verified as suitable.

R. Substituted items or items other than first named shall be equal or better in quality and performance and must be suitable for the available space, required arrangement, application, and clearances. Submit any and all data necessary to determine the suitability of substituted items. Substitutions must be submitted for consideration seven (7) days prior to the original bid date. Consideration of substitutions shall be at the sole discretion of the Engineer. Substitution submittals shall include all information required in the "Submittals" sub-section of this specification section, as well as all other requirements indicated throughout the Division-26 specifications. All changes incurred as a result of a substitution shall be provided at no additional cost to the Owner.

S. Substitutions will not be permitted for specific items of material or equipment where specifically noted.

T. Compliance Review Form: Each equipment submittal must include a Compliance Review Form formatted as follows:

1. Section 1: Certify that the submittal is in complete compliance with the plans and specifications, except for the numbered and footnoted deviations and exceptions as defined herein. Deviations or exceptions taken in a cover letter or by contradiction or omission shall not constitute a release from the requirement that the equipment be in complete compliance with the plans and specifications.
2. Section 2: Provide a detailed paragraph by paragraph annotation of the specification with an individual "C", "D", or "E" noted in the margin, as follows:

    a. "C" shall mean compliance with no exceptions. Provide a numbered footnote (i.e. C1, C2, C3, etc.) for each comment or clarification.
    b. "D" shall mean compliance with deviations. For each deviation, provide a numbered footnote (i.e. D1, D2, D3, etc.) with a detailed explanation of how the intent of this specification is to be satisfied.
    c. "E" shall mean exception. The equipment offered is not in compliance with the specifications. For each exception, provide a numbered footnote (i.e. E1, E2, E3, etc.) with a detailed description of the exception.

U. Electronic Submittals: Should the contractor elect to submit electronic shop drawings/submittals, the procedure shall be as follows:

1. Provide a transmittal with the electronic shop drawing/submittal indicating that the document was transmitted electronically. Transmittal shall also include verification of the contractor's review indicating compliance with the contract documents.
2. Sequentially number all pages on the electronic shop drawing/submittal. The total number of pages shall be reflected in the transmittal.
3. Submittal review comments shall be transmitted electronically. Large documents will be scanned with comments as necessary and returned electronically.
4. All shop drawings such as, but not limited to: coordination drawings, ductwork shop drawings, fire alarm drawings, ductbank layouts, etc. shall be submitted in hard copy, full size format.
5. Provide hard copy of the shop drawing/submittal for each of the Operations and Maintenance Manuals.
6. Failure to comply with the above will result in the submittal being returned and marked "Not Reviewed".

V. The engineer will provide a maximum of two (2) submittal reviews per equipment submittal; the initial review plus one (1) re-submittal. Should the re- submittal be returned "Not Acceptable" or "Revise and Resubmit", the contractor shall choose one of the following courses of action:

1. Provide the exact manufacturer and model indicated in the contract documents as the basis of design, or
2. Reimburse the engineer for all additional review time required to achieve a submittal review from the engineer of "No Exceptions Taken."

Should the contractor choose option 2 above, the engineer shall be reimbursed at an hourly rate of $175 per hour with payment due prior to the return of the final submittal. In addition, the contractor shall accept complete responsibility for all delays resulting from the submittal review process extending beyond two (2) reviews per equipment submittal.

W. Resubmittals: Resubmittals shall comply with paragraph 1.06 of this section and the following additional requirements.

1. Resubmittals shall include a written response to each submittal comment. Provide a detailed comment by comment annotation of the submittal review comments with an individual "C", "D", or "E" as follows:

a. "C" shall mean compliance with no exceptions. Provide a numbered footnote (i.e. C1, C2, C3, etc.) for each comment or clarification.
b. "D" shall mean compliance with deviations. For each deviation, provide a numbered footnote (i.e. D1, D2, D3, etc.) with a detailed explanation of how the intent of this specification is to be satisfied.
c. "E" shall mean exception. The equipment offered is not in compliance with the specifications. For each exception, provide a numbered footnote (i.e. E1, E2, E3, etc.) with a detailed description of the exception.

1.07 RECORD DOCUMENTS

A. The Contractor shall maintain a record set of electrical prints at the project site and shall indicate thereon any changes made to the contract drawings, including, but not limited to addenda, field sketches, RFI responses, supplemental drawings, sketches, etc. Where changes are made that are reflective of supplemental instructions, revisions, RFI responses, etc., the Contractor shall make clear references to those changes.

B. A separate set of neat, legible electrical contract prints shall be kept at the project site at all times during the construction of the work for the express purpose of showing any and all changes indicated in paragraph A. above. The prints shall be marked up daily showing all changes to the original documents.

The prints shall be marked up in a neat, legible manner using a red pen. Periodic review of the Record Documents will be conducted by the Owner's Representative or A/E. Should this review indicate that the Record Documents are deficient or not up to date, the Contractor shall immediately bring the documents into compliance and make the corrections

C. Upon completion of the project and before final close-out, the Contractor shall be responsible for producing a final set of record documents in electronic CADD format. One (1) set of full size prints, one (1) CD of the electronic CADD drawings (in AutoCad and pdf format), along with the red-lined marked up field set shall be delivered to the owner upon completion. If requested, the electronic CADD documents shall be up-loaded to the owner's FTP site. The final CADD documents shall indicate in the title or revision block "RECORD DOCUMENTS" along with the date completed. The electronic format shall be compatible with the owner's preferred version of AutoCad. Coordinate with the owner before producing the CD or up-loading to the FTP site. Not acceptable are contractor installation drawings, shop drawings or multi-layers of work on a single drawing. The final as-built product shall mirror the contract bid documents using the project page layout, format and project title block.

D. Computer (CADD) files of electrical drawings will be made available to the Contractor upon receipt of a signed waiver (available upon request). One CD will be made available to the general contractor or construction manager for distribution to the trades.

E. Should the Contractor's electronic Record Documents not be considered complete, they will be returned for completion and/or correction.

1.08 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Upon completion of all work, the Contractor shall thoroughly instruct the Owner's representatives in the proper operation and maintenance of all electrical equipment and systems. Instructions shall be done only after completed systems have been put into operation and tested for proper operation and performance. Instructions shall be given only by experts in the equipment or systems and shall include descriptions and demonstrations for procedures of operation, data record keeping, etc.

B. The Contractor shall demonstrate, by actual usage, the proper operation of each and all portions of the various systems to the Owner or his appointed representative. Additional instructional periods shall be provided as required elsewhere in these specifications.

C. Following completion of the Electrical Contract and prior to the instructional period and final acceptance of the contract, the Contractor shall prepare three (3) Operating and Maintenance Manuals describing the electrical systems and equipment. Data in the manuals shall include, but not be limited to, the following:

1. Test results for all testing conducted in accordance with Division-26

Section, "Inspections, Testing and Start-up".

2. List of materials and equipment with name and address of vendor.
3. List of lamps, fuses (style and ampere rating), overload heaters, and other expendable equipment and devices with type, size or ordering description with name and address of vendor.
4. Operating, maintenance, and installation instructions for all systems and components with name and address of vendor and servicing supplier.
5. A certificate of approval from the Electrical Inspector.
6. A final copy of the approved coordination, short circuit and arc flash study.
7. Final copies of shop drawings and submittals.
8. Manufacturer's guarantees and warranties.

D. Manuals shall be of the loose leaf type, in heavy duty binders, with a master index and dividers with plastic tabs indicating system and equipment described.

E. Contractor shall undergo training and any video of training.

1.09 RISER PLAQUE

A. Provide a computer generated riser diagram, 24" x 36" (600 mm x 900 mm) (nominal), of the completed distribution system showing incoming services, distribution boards, feeders, transformers, panelboards, and related equipment. All feeders and circuits shall be sized and all equipment identified. Drawing shall be framed with plexiglass overlay.

1.10 GUARANTEE

A. Guarantee obligations shall be as hereinbefore specified in the GENERAL PROVISIONS of these specifications, except as follows:

1. Guarantee the complete electrical system free from all mechanical and electrical defects for a period of two (2) years beginning from the day of final acceptance of the work or beneficial occupancy by the Owner, whichever occurs first.
2. During the guarantee period, the Contractor shall be responsible for the proper adjustments of all systems, equipment and apparatus installed by him and do work necessary to insure efficient and proper functioning of the systems and equipment.
3. Upon receipt of notice from the Owner of failure of any part of the electrical installation during the guarantee period, new replacement parts shall be furnished and installed promptly at no cost.
4. Within the two (2) year warranty/guarantee period, manufacturer’s recommended maintenance shall be provided by the Contractor.

1.11 DEFINITIONS

A. The following definitions apply to firestopping:

1. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
2. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
3. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gases and smoke.
4. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
5. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.
6. System: Specific products and applications classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
7. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

PART 2 - PRODUCTS

2.01 MATERIAL AND EQUIPMENT

A. All materials and equipment shall be new, the best of their respective kinds and suitable for the conditions and duties imposed on them. Replacement parts shall be available. A permanent service organization maintained or trained by the manufacturer shall be available for service.

B. The Contractor shall set-in place and connect all electrical equipment furnished under Division-26 and all other Divisions of the Contract.

C. Verify exact electrical service requirements for each piece of equipment receiving electrical connections. Provide proper service for each.

D. Include any and all items required by the National Electrical Code and field conditions for the proper connection and installation of each piece of equipment.

E. Products of one manufacturer shall be used where two or more items of the same kind are required.

2.02 EQUIPMENT DEVIATIONS

A. The Contractor shall be governed by the requirements of the GENERAL PROVISIONS of these specifications. After an item has been approved, no substitution will be permitted except where such substitution is considered by the Engineer to be in the best interest of the Owner.

B. The Contractor shall notify the Engineer of any changes in electrical characteristics of equipment being installed as opposed to that specified.

C. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, ductwork, wiring, or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings, and detailing required shall, with the approval of the Engineer, be prepared by the Contractor at the Contractor's own expense.

D. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, with the approval of the Engineer, the Contractor shall furnish and install such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

2.03 FIRESTOPPING

A. All penetrations through fire barriers shall be firestopped with an approved material that is capable of maintaining the fire resistance rating of the barrier. All firestop sealants shall conform to ASTM E 814, ASTM E 119, UL 1479, UL 2079 CAN/ULC S115, and CAN/ULC S101.

B. Firestop material shall be latex based, intumescent caulk intended for use for all thru-penetrations with piping, ducts, cable trays, conduit, and cables.

C. When exposed to high temperatures or fires, the caulk shall expand in volume to quickly close off voids left by melting or burning construction materials. Caulk shall be applied by a standard caulk gun and remain flexible after curing.

D. Acceptable products shall be limited to Johns Manville “Firetemp-C1;” Hilti “FS-One;” or 3M “CP25WB+.” Coordinate with General Contractor such that a single manufacturer/product is utilized throughout the project for all fire and smoke stopping materials.

2.04 SMOKE STOPPING

A. All penetrations through smoke barriers, smoke partitions, or any other surface required to resist the passage of smoke shall be provided with a smoke stop sealant and/or system that has been independently tested to provide an acceptable smoke seal that will resist the passage of smoke. Smoke stop systems (including product and installation) shall conform to all applicable standards (including but not limited to ASTM, UL and NFPA), as well as all other local, state or federal requirements.

B. Acceptable manufacturers shall be limited to the manufacturers that may provide firestopping materials/systems (see paragraph 2.03 of this section).

Coordinate with the General Contractor such that a single manufacturer/product is utilized throughout the project for all fire and smoke stopping materials.

PART 3 - EXECUTION

3.01 SUPERVISION AND COORDINATION

A. The Contractor shall have competent supervision on the site at all times to layout, check, coordinate and supervise the installation of all electrical work and be responsible for the accuracy thereof. He shall plan the installation of all electrical work, giving consideration to the work of other trades, to prevent interference.

B. Determine the location, size, etc. of all chases, sleeve openings, etc. required for the proper installation of the electrical work and see that such are provided. All chases, sleeves, openings, etc. shall be set prior to erection of new work to prevent delay in the progress of other work or trades.

C. Conditions and/or situations which prevent the proper installation of any equipment or item where shown on the drawings shall be called to the attention of the Engineer for instructions.

D. Equipment shall be shipped or fabricated in sections of suitable size for entering the building and being removed from the finished building in the future if necessary.

E. Fully investigate all peculiarities and space limitations for all materials and equipment.

F. Outlet, pull and junction boxes and appliances which require operation, examination, adjustment, servicing or maintenance shall be readily accessible.

G. Take all field measurements necessary for this work and assume responsibility for their accuracy.

H. Coordinate the electrical work with all sub-contractors. All work shall be so arranged that there will be no delay in the proper installation and completion of any part or parts of electrical equipment. All electrical work shall be installed in proper sequence with other trades without any unnecessary delay.

I. Make all sub-contractors, suppliers and manufacturers fully aware of all requirements of the Contract.

J. Coordinate the spacing and arrangement of lighting fixtures, diffusers, and grilles to establish a symmetrical pattern.

K. Coordinate the rough-in of all electrical work performed under other Divisions of these specifications.

L. Drawings indicate the approximate locations of outlets, apparatus and

equipment. The runs of feeders and branch circuits as shown are schematic. Final routing is governed by structural conditions and other obstructions. This does not mean that the design may be changed; it merely refers to the exact run of a raceway between given points.

M. The drawings are diagrammatic and indicate the general arrangement of the equipment, the runs of conduit and the manner of connection.

N. The architectural, structural, mechanical, as well as the electrical drawings, shall be consulted in order to be entirely familiar with conditions to be encountered and special details.

O. The Contractor shall be solely responsible for the proper arrangement of conduit.

P. The Engineer shall make all final decisions as to any conditions which require the changing of any work.

3.02 STORAGE AND PROTECTION OF EQUIPMENT AND WORK

A. All materials and equipment shall be properly and effectively protected by the Contractor during the execution of the work.

B. All electrical equipment to be used in the construction shall be properly stored and protected against the elements. All equipment shall be stored under cover and shall not be stored at the construction site on the ground, in mud, water, snow, rain, sleet or dust. Large diameter cables may be stored on reels outside, however, all cable ends shall be waterproofed and the reels covered with weatherproof materials. Such weatherproof materials shall be heavy-duty, securely fastened and made impervious to the elements.

C. Conventional electrical construction materials such as building wire, outlet and junction boxes, wiring devices, conduit, lighting fixtures, fittings, etc., shall be stored in construction buildings, covered trailers or portable covered warehouses. Any equipment subject to damage or corrosion from excessive moisture shall be stored in dry, heated areas. Any equipment containing plastic or material subject to damage caused by excessive heat or sunlight shall be stored to prevent such damage. This includes plastic ducts and lenses.

D. All gear and equipment, if delivered to the construction site before the building is under cover and the equipment site prepared shall be warehoused and protected. All gear and equipment shall be covered and protected from the elements and other damage and shall be stored in a clean, dry, heated atmosphere, under cover at the Contractor's expense.

E. All gear and equipment delivered to the construction site after the building is under cover shall be protected as described above and in addition shall be provided with auxiliary heat to prevent condensation damage. The gear shall also be protected against damage caused by carelessness of workmen who are installing equipment connected to or adjacent to the above electrical equipment.

F. Equipment damaged as a result of the above conditions shall be properly repaired at the Contractor's expense or shall be replaced at the Contractor's expense, if, in the opinion of the Engineer the equipment has been damaged to such an extent it cannot operate properly after repairs are made.

G. All electrical enclosures exposed to construction damages such as paint spots, spackling or plaster spatter, grout splashes, waterproofing compound, tar spots or runs and pipe covering compound splashes, shall be completely covered and protected against damage.

H. In the event leakage into the building of any foreign material or fluid occurs or may occur, the Contractor shall take all steps as described above to protect any and all equipment.

I. After connections to electrical equipment are complete and the equipment is ready for operation, all construction debris shall be removed from all enclosures. Such debris includes dust, dirt, wire clippings, tape and insulation removed in order to make connections.

3.03 CUTTING AND PATCHING

A. All cutting of walls, floors, roofs, ceilings and/or partitions for the passage of conduit, etc., and closing up of superfluous openings around them in connection with the work under this contract, including the removal of all debris caused thereby, shall be performed by the Contractor.

B. All cutting, patching and finishing shall be performed in accordance with the requirements of the respective division of the specification and shall conform to adjacent work, subject to the approval of the Engineer.

C. Any work already in place that has been disturbed in the execution of the work shall be repaired and restored in harmony with the surrounding work.

D. Do not cut structural members without approval of the Engineer.

E. Patching shall be uniform in appearance and shall match with the surrounding surface.

3.04 PENETRATION OF WATERPROOF AND FIREPROOF CONSTRUCTION

A. Coordinate the work to minimize penetration of waterproof construction including roofs, exterior walls and interior waterproof construction. Where such penetrations are necessary, provide all necessary curbs, sleeves, shields, flashings, pitch pockets, fittings and caulking to make the penetrations absolutely watertight.

B. Where waterproofing or fireproofing have been removed or damaged in the execution of the work, the Contractor shall have such damage repaired by the respective trades working on the project.

C. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.

D. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

E. Slots, sleeves and other penetrations in floors, walls, or other general construction shall be closed and sealed with an approved firestopping material.

F. Floor slots and openings shall be closed with 16 gauge (1.6 mm) galvanized steel sheet supported on 1-inch by 1-inch by 1/8-inch (25 mm by 25 mm by 3 mm) structural angle drilled or supported with powder-driven studs into the building structure. Firestop with a layer of firestopping material not less than 1-inch (25 mm) thick which completely fills the opening. The top surface of the firestopping material shall be approximately 1-inch (25 mm) below the finished floor slab.

G. Openings in walls shall be closed with 16 gauge (1.6 mm) galvanized steel sheet securely attached at the midpoint of the wall thickness and firestopped on both sides of the steel sheet with not less than 1/2-inch (13 mm) thick layer of non- sagging firestopping material to fully cover the opening.

H. Single or multiple pipes passing through walls and floors shall have the annulus space between pipes or between pipes and structure filled with firestopping material to provide a fire rating equal to the rating of the floors and walls being penetrated. The annulus between exposed conduit and walls or floors in finished spaces shall be filled, sealed, and painted to match adjacent surfaces.

I. In fire-rated partitions where horizontal separation of opposite-facing electrical boxes is less than 24 inches, provide UL listed firestop around electrical boxes as required to maintain fire rating of wall.

3.05 MANNER OF INSTALLATION

A. Provide equipment supports consisting of structural racks, hangers, rods, etc.

B. Equipment supports shall be designed and constructed to safely support and distribute loads evenly over building areas, and withstand stresses to which they may be subjected.

C. Coordinate the location and installation of supports and sleeves to be set in concrete.

D. Provide finish metal access doors and frames as indicated or required for access to concealed electrical equipment requiring inspection, adjustment, maintenance, manual operation, etc., or required by code.

E. In suspended metal pan, lay-in-panel, and accessible tile ceilings, the ceiling element may be used as the access panel.

F. Access doors in 1-1/2 hour fire-rated construction shall bear the Underwriter's Laboratories "B" label.

G. Floor-mounted equipment (generators, transformers, starters, control cabinets, etc.) shall be provided with concrete foundations.

H. Concrete foundations shall be reinforced to suit the loads placed on them and shall be in strict accordance with the equipment manufacturer's recommendations. Concrete materials and methods shall be as specified in Division-3 of these specifications. The Contractor shall refer to this Division to determine specific requirements.

I. Unless otherwise indicated or required, concrete foundations shall extend 4-inches (100 mm) above the finished floor, at least 3-inches (75 mm) beyond the equipment base in all directions, shall have the top edges chamfered 1" (25 mm) and shall have the same surface finish as the adjacent and surrounding floor. Where equipment weight is such that the floor slab will support the equipment the concrete foundations shall be securely anchored to the floor slab with steel dowels. Properly prepare existing floors: remove paint or dirt, clean and scarify as necessary.

J. The Contractor shall furnish and set, with proper templates, all anchor bolts and inserts required for the proper attachment of his equipment to the concrete foundations. Anchor bolts shall be of the size and number required by the equipment and/or recommended by the equipment manufacturer and shall be in accordance with the requirements detailed on the drawings and/or specified herein. Anchor bolts shall also be compatible where applicable, with vibration isolation requirements specified for the equipment. Anchor bolts shall be of adequate size and shall engage a steel plate of adequate dimensions cast into the slab.

K. The drawings indicate the wiring method. The number of current carrying conductors per raceway or cable shall be as indicated. The number of current carrying conductors cannot exceed three (3) per raceway or cable, unless the ampacity adjustment factors of NEC Article 310 are applied.

3.06 CLEANING AND PAINTING

A. All equipment and conduit shall be thoroughly cleaned of all cutting waste from reaming and tapping. All burrs and other foreign matter shall be removed. Should any part of the system be stopped up by such refuse after the various equipment and apparatus have been accepted, the Contractor shall be required to pay for all labor and materials required to locate and remove the obstruction, and replace and repair all work in any way disturbed thereby. All enclosures, etc., shall be cleaned of all rubbish, plaster, and other debris at the completion of the work.

B. Paint all exposed metal surfaces, except for galvanized surfaces and extruded aluminum cable and wire duct, of all electrical equipment in mechanical rooms

and equipment spaces. Paint all backboards in all telephone and electrical rooms.

C. Do not paint nameplates or other elements where such application would interfere with operation or maintenance of equipment.

D. All scratches or marred areas on factory painted equipment shall be touched up to match finish.

3.07 IDENTIFICATION

A. Equipment (disconnects, panelboards, starters, relays, switches with pilot lights, pushbutton stations, etc.) shall be identified as to its function, equipment, or area served, etc. In finished areas and mechanical rooms and equipment spaces identification shall be engraved phenolic plates with approximate 3/16" (5 mm) high black letters on white background. Equipment connected to the emergency power system shall be provided with phenolic plates utilizing white letters on red background. Plates shall be attached to front of devices with stainless steel, oval head, machine screws. Panelboards and equipment cabinets shall also be identified with stenciled letters, 3/4" (19 mm) high, on inside of cabinet door, colored to contrast with background.

B. All conduits containing electrical feeders shall be identified with vinyl cloth pipe markers by W.H. Brady or Seton. Labels shall be applied whenever a conduit enters or leaves a switchboard, panelboard, or a junction or pull box, and at each side of penetrations of walls or floors. Provide individual numbers and letters to indicate feeder number and voltage.

C. All pull box and junction box covers shall be stenciled to indicate voltage, service and/or system. All stenciling shall be clear and legible from a distance of five (5) feet.

D. No embossed plastic tape markers will be permitted for use in marking equipment.

E. All underground feeders, branch circuits, ductbanks, etc. shall be identified with a continuous plastic tape equal to Allen Marking Tape. Tape shall be six inches wide, waterproof, chemically resistant, yellow marked "Caution - Buried Electrical Line Below". Tape shall be located approximately midway from grade to top of feeder.

F. Receptacle Cover Plates: Provide label on front of cover plate unless otherwise noted. Label shall indicate source panel and circuit number. Label shall be a laminated, adhesive backed, peel-off, polyester type label. Label shall be comprised of a polyester base/substrate and a clear polyester top layer/laminate. The label ink shall be printed underneath the clear polyester laminate. Label shall have black lettering on clear background. Label width shall be a nominal 0.47” (12 mm) wide. Basis of design is the TZe labeling tape by Brother Mobile Solutions, Inc. For use with the Brother P-Touch EDGE Series labeling tools.

G. All identification shall be subject to the approval of the Engineer.

3.08 EXAMINATION OF SITE

A. The Contractor shall examine the premises prior to submitting his bid and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made for any work in connection with any error or negligence on the Contractor's part. No claim for extra compensation will be recognized for difficulties encountered which, in the opinion of the Owner, would have been revealed by proper examination.

B. If any hazardous materials are found, all work shall stop and the DGS project manager shall be notified ASAP.

3.09 ELECTRICAL DEMOLITION

A. All demolition of existing electrical equipment, conduit, wiring devices, lighting fixtures, etc. shall be performed under this section of the specification. The areas of demolition are defined on the drawings.

B. The electrical demolition in the renovation areas indicated on the drawings shall be complete and include all electrical work in the area unless noted otherwise.

C. Existing electrical systems passing through areas of demolition to serve equipment beyond the demolition areas shall remain in service, or be suitably relocated and restored to normal operation, throughout the demolition and reconstruction of the area. The Contractor shall investigate and identify such equipment prior to demolition.

D. Provide temporary electrical service to equipment disturbed by the demolition until such time as the permanent service can be restored.

E. The local power company shall disconnect and remove all equipment and facilities that they own and/or maintain (if needed to be removed). The Contractor shall make and be responsible for all arrangements with the local power company to accomplish removal of their equipment.

F. Where conduit and wiring to remain are inadvertently damaged or disturbed, cut out and remove damaged portion and all damaged wiring from the source switchboard, panelboard or pullbox to the destination connection point. Provide new wiring of equal capacity.

G. Exposed conduit and conduit within accessible ceilings, floors and walls to be demolished shall be removed in its entirety, including all conduit, supports, junction boxes, etc. Conduit concealed within non-accessible ceilings, floors and walls abandoned in place, shall be cut flush with walls and floors, plugged, and the adjacent surface patched to match existing.

H. Wiring to be demolished shall be removed from both concealed and exposed conduit. No wiring which becomes unused as a result of the Contract shall be

abandoned in place.

I. Equipment specified or indicated to be demolished, shall be removed from the project site and shall not be reused. Equipment required to be temporarily disconnected and relocated shall be carefully removed, stored, cleaned, reinstalled, reconnected and made operational.

J. All material being disposed of shall be done as required to meet the applicable environmental regulations for all local, state, and federal agencies. Examples include, but are not limited to, light fixture ballasts, fluorescent lamps, and batteries.

K. Any outages in systems shall be coordinated with the Owner. Where duration of proposed outage cannot be tolerated by the Owner, provide temporary connections as required to maintain service.

L. Disconnect abandoned outlets and remove devices and wiring back to point of use. Provide blank cover for abandoned outlets.

M. The contractor shall use care when performing selective building and site demolition. The contractor shall be responsible for damage inclusive of but not limited to: building finishes, lighting (interior and exterior), furniture, structure, site, utilities (above and below ground), mechanical, plumbing, telecommunications and electrical equipment / systems. Should any damage occur or should any remedial work be required, the contractor shall be responsible to repair and or replace the damaged item(s) to the Owner's satisfaction at no additional cost. The contractor shall be responsible for surveying (including contacting Miss Utility), photo documenting and restoring the surrounding work site(s) to the original pre-demolition condition and / or to the Owner's satisfaction upon completion of the work at no additional cost.

N. Repair adjacent construction and finishes damaged during demolition. Patch all holes left from demolished equipment. Paint surfaces exposed by demolition to match adjacent surfaces.

3.10 CONNECTIONS TO EXISTING WORK

A. When the work specified hereafter connects to any existing equipment, conduit, wiring, etc., the Contractor shall perform all necessary alterations, cutting, fitting, etc., of the existing work as may be necessary or required to make satisfactory connections between the new and existing work and shall leave the completed work in a finished and workmanlike condition, to the satisfaction of the Engineer.

B. When the work specified hereafter or under other Sections or Divisions of the contract necessitates relocation of existing equipment, conduit, wiring, etc., the Contractor shall perform all work and make all necessary changes to existing work as may be required to leave the completed work in a finished and workmanlike manner to the satisfaction of the Engineer.

C. The Contractor is cautioned that all existing electrical systems and life safety systems must remain in service during all phases of construction.

D. The Contractor shall work in close cooperation with the Owner for any temporary outages.

E. It is imperative that all interruptions of the electrical service and standby service be kept to an absolute minimum. The Contractor must submit a written request to the Owner for any and all interruptions of the electrical service or the standby service two (2) weeks in advance of the planned outage.

3.11 WORKMANSHIP

A. All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat or workmanlike appearance shall be removed and replaced when so directed by the Engineer. The removal and replacement of this work shall be done, when directed in writing by the Engineer, at the Contractor's expense.

3.12 REPAIR OF EXISTING PROPERTY

A. All work shall be carefully laid out in advance, and where cutting, channeling, chasing, trenching, or drilling of floors, walls, partitions, ceiling, or other surfaces is necessary for the proper installation, support, or anchorage of raceways, outlet boxes, or other electrical work, this work shall be carefully done, and any damage to building, piping, equipment, or ground shall be properly repaired by skilled mechanics of the trades involved, at no additional cost to the Owner.

3.13 TEMPORARY ELECTRICAL SERVICE

A. The Contractor shall provide temporary electrical service on the site as is necessary to enable his work and the work of others on the job to proceed and to test the operation of all apparatus, devices, systems which require electrical energy.

B. The Contractor is responsible for temporary power as may be required for construction or as may be required to maintain critical operations during changeover of feeders or services. The Contractor is responsible for providing all equipment, making all arrangements (including all work needed to submit a service application to the power company), and making all connections required for temporary power. Provide generators for temporary power if needed.

C. The Contractor shall disconnect and remove all equipment and facilities required for temporary power at the completion of the project.

3.14 PUNCH-OUT PROCEDURES

A. Preliminary Punch-out:

1. Prior to requesting an inspection from the Owner, Engineer, or Permit Official, the General Contractor or Construction Manager (GC or CM) shall provide a preliminary punch-out of the area in question.
2. Once completed, their punch list shall be supplied to each trade for corrections and completion. The punch list shall also be provided to the Engineer for their use.
3. Upon being informed that the trade contractors have addressed all of the outstanding items, the GC / CM shall backcheck the work and update the punch list.

B. Final Punch-out:

1. Final punch-out by the engineer shall not commence until the GC or CM has exhausted their review and has signed off on all items.
2. A copy of the sign-off shall be provided to the Engineer for their record.
3. Once the above has been completed, the Engineer shall be notified that the work is substantially complete and ready for a final punch-out.

END OF SECTION
260502

SECTION 260504
INSPECTIONS, TESTING & STARTUP

PART 1 - GENERAL

1.01 DESCRIPTION

A. The intent of the inspection, testing, and check-out work specified herein is to ensure that all electrical workmanship and equipment, whether Owner furnished or Contractor furnished, is installed and performs in accordance with the Contract Documents, manufacturer's instructions and all applicable codes and requirements. Also, it is intended to insure the following:

1. Equipment has not been subjected to damage during shipment or installation.
2. Equipment is in accordance with the specifications.
3. A benchmark is established for routine maintenance and troubleshooting.
4. Successful start-up without last minute interruptions and delays.
5. Each system component is installed satisfactorily and will perform its function reliably throughout its life and the life of the overall system.

B. Testing requirements in other sections of this Specification are intended to compliment and not supersede nor be superseded by this Section.

1.02 RELATED SECTIONS

A. Division-1 Section – Contract Closeout.

B. Division-1 Section - Quality Control.

C. Division-1 Section – Final Cleaning.

D. Division-26 - Electrical Specifications.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C2, National Electrical Safety Code
2. ANSI Z244-1, American National Standard for Personnel Protection

B. American Society of Testing and Materials (ASTM).

C. Institute of Electrical and Electronic Engineers (IEEE).

D. Insulated Cable Engineers Association (ICEA).

E. International Electrical Testing Association (NETA).

F. National Electrical Manufacturer's Association (NEMA).

G. National Fire Protection Association (NFPA):

1. ANSI/NFPA 70, National Electrical Code
2. ANSI/NFPA 70B, Electrical Equipment Maintenance
3. ANSI/NFPA 70E, Electrical Safety Requirements for Employee Workplaces

H. Occupational Safety and Health Administration (OSHA).

I. State and Local Codes and Ordinances.

1.04 SUBMITTALS

A. Provide resumes for personnel conducting tests and evidence of the testing firm's qualifications, accreditation, and experience.

B. Provide a list of test equipment to be utilized including the manufacturer's name, model number, serial number, accuracy, and last date of calibration.

C. Provide industry standards or guide specifications used in lieu of National Standards.

D. Provide testing procedures and schedules.

1.05 TESTING FIRM

A. When an independent testing firm is utilized, the following shall apply. The testing firm shall be a competent, independent electrical equipment testing laboratory or organization. The testing firm shall not be a subsidiary, division, nor department of either the installing Contractor or the manufacturer of the equipment materials or systems being inspected and tested. The testing firm shall be a fully accredited member of the International Electrical Testing Association (NETA) and have the specialized experience and skill in the supervision and performance of all inspection and testing specified herein.

1.06 TEST INSTRUMENT CALIBRATION

A. The testing firm or contractor shall have a calibration program which assures that all applicable test instrumentation is maintained within rated accuracy.

B. The accuracy shall be directly traceable to the National Institute of Standards and Technology (NIST).

C. Instruments shall be calibrated in accordance with the following frequency schedule:

1. Field instruments, analog: six (6) months.
2. Field instruments, digital: twelve (12) months.
3. Laboratory instruments: 12 months.
4. Leased specialty equipment: 12 months.

D. Calibration labels shall be visible on all equipment and shall have a date of calibration and due date. Calibration records shall be available for review by the Owner.

PART 2 – PRODUCTS

Not Applicable

PART 3 -

EXECUTION

3.01 COORDINATION

A. Provide all necessary supervision and labor, materials, tools, test instruments and other equipment or services required to inspect, test, adjust, set, calibrate, functionally and operationally check all work and equipment.

B. When an independent testing firm is utilized, provide a set of contract documents to the testing firm.

C. When an independent testing firm is utilized, provide a copy of the approved short-circuit and protective device coordination study to the testing firm.

D. Provide the testing firm a set of approved submittals and shop drawings for the equipment to be tested by the testing firm.

E. Prepare procedures and schedules for all inspections, tests, settings and calibrations specified or otherwise required. The procedures must provide specific instructions for the checking and testing of each component in addition to the system functional checks. All procedures submitted shall include proposed job safety rules.

F. Provide a suitable and stable source of electrical power to each test site. The testing firm shall specify the specific power requirements. The Owner shall approve all sources of electrical power for testing.

G. Notify the Owner prior to the commencement of any testing.

3.02 INSPECTIONS AND TESTS

A. Equipment purchased by the Contractor or purchased by the Owner but installed by the Contractor shall be inspected and tested to determine its condition.

B. The inspections, tests and checks described herein shall not be considered as complete and all inclusive. Additional normal standard construction (and sometimes repetitive) checks and tests shall be provided as necessary throughout the project, prior to final acceptance by the Owner.

C. At any stage of construction and when observed, any electrical equipment or system determined to be damaged, faulty, or requiring repairs shall be reported to the Owner. Corrective action may require prior approval.

D. Perform routine insulation resistance, continuity and phase rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein.

E. An independent testing firm shall provide NETA ATS testing of the following systems and equipment.

1. Medium voltage cables and terminations
2. Medium voltage transformers
3. Grounding systems
4. Generator sets & Fuel Tank and associated HVAC dampers (tested concurrently)
5. Automatic transfer switches (test with Generator).
6. Load Bank (test with Generator).
7. Low voltage circuit breakers rated 400 amperes and higher
8. Fire alarm system.

F. At the option of the Contractor, either an independent testing firm or the Contractor shall provide NETA ATS visual and mechanical inspections of the following systems and equipment.

1. Panelboards
2. Low voltage wiring (600 volt and below)
3. Molded case circuit breakers rated less than 400 amperes
4. Motor control
5. Duct banks prior to backfill.
6. Handholes.
7. Grounding prior to backfill / cover.

G. All circuit breakers and protective devices shall be set and tested at the settings specified in the approved protective device coordination study. All fuses shall be selected and installed in accordance with the approved coordination study.

H. The rotation of all motors shall be checked and corrective action shall be taken where necessary to obtain correct rotation.

I. Engagement of an independent testing firm in no way relieves the Contractor of the responsibility for the performance of the many and varied tests, checkouts, and inspections required during the various stages of construction.

3.03 CERTIFICATION

A. Provide certified test reports. Test reports shall meet the criteria specified in OSHA Regulation Part 1907, “Accreditation of Testing Laboratories”. The certification shall attest to the fact that the electrical installation has been installed and tested in accordance with the applicable National Standards or, where no National Standard exists, the applicable industry standard or guide specification for the equipment involved.

B. The following information shall be included in the test reports.

1. Description of equipment tested (manufacturer, model number, serial number).
2. Description of test and standards used.
3. Description of test equipment.
4. Test results with pass/fail criteria.
5. Conclusions and recommendations.
6. Names of personnel conducting the test.

C. When testing is provided by an independent testing firm, the report shall be signed by a Registered Professional Engineer.

D. Provide three (3) copies of the complete test report no later than thirty (30) days following completion of the tests.

END OF SECTION 260504

SECTION 260519
LOW VOLTAGE POWER CONDUCTORS & CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, Basic Electrical Materials and Methods, apply to this Section.

1.02 SUMMARY

A. The Contractor shall provide, install and terminate all wires and cables for power, lighting, signal, control and related systems rated 600 volts and less.

1.03 SUBMITTALS

A. Submit product data for electrical wires, cables and connectors.

1.04 QUALITY ASSURANCE

A. All wires, cables and connectors and the installation of wires, cables and connectors shall comply with the following standards:

1. NFPA 70 "National Electrical Code."
2. UL Standards pertaining to wires and cables:

    a. UL Std 44, Rubber Insulated Wires and Cables
    b. UL Std 83, Thermoplastic - Insulated Wires and Cables
    c. UL Std 486A, Wire Connectors and Soldering Lugs for Use with Copper Conductors, UL Std 486B for Use with Copper or Aluminum
    d. UL Std 854, Service Entrance Cable

3. Applicable NEMA Standards pertaining to wires and cables.
4. Applicable IEEE Standards pertaining to wires and cables.

B. Wires, cables and connectors shall be listed and labeled by

PART 2 - PRODUCTS

2.01 WIRES AND CABLES

A. All wiring #14 and larger shall be soft drawn copper, 98 percent conductivity, 600 volt insulation, type THHN/THWN.

B. All wiring #8 and larger for feeders and branch circuits shall be stranded.

C. All wiring shall have identification markings along the outer covering denoting conductor size, type of insulation, and manufacturer's trade name. All wiring shall be color coded as follows:

PHASE	120/240 VOLTS
A	Black
B	Red
Neutral	White
Ground	Green

D. Wiring in sizes up to #8 shall have colored insulation, wiring in sizes #6 and larger shall be coded by colored tape applied no more than 6 inches (150 mm) from each termination and spanning a minimum length of 6 inches (150 mm) of insulation.

E. Alternates
1. Alternate 1 -Level 2 Vehicle Chargers

PART 3 - EXECUTION

3.01 WIRING METHODS

A. All wiring for lighting and power circuits shall be sized as follows unless otherwise indicated:

120 Volt, 20A Branch Circuit Length	Wire Size
0-75' (0-22.5 m)	#12
75-150' (22.5-45 m)	#10
Over 150' (Over 45 m)	# 8

In accordance with the above where the size of branch circuit conductors is increased by the minimum required by the NEC for the branch circuit rating, it is the Contractor's responsibility to ensure that the termination provisions of all equipment connected to such circuits are listed as suitable for the conductor sizes involved.

B. Wire pulling compounds shall be polywater or equivalent. The use of oils and greases shall not be permitted.

C. All field-installed control wire and cable terminating in panelboards, junction boxes, etc. shall be identified with pre-stamped tubular type markers or pressure sensitive linen labels covered with clear heat shrinkable tubing.

Labels shall indicate circuit numbers, terminal numbers, etc. of each conductor. The identification labels shall be as manufactured by the W.H. Brady Company, Tyton, or equivalent.

D. No conductors shall be installed in raceways before the raceway system is properly installed and all work on the building which is liable to injure the conductors has been completed. Immediately before installing the conductors, the raceway, fittings and boxes shall be thoroughly cleaned and dried.

G. The sharing of the neutral conductor for branch circuits is prohibited.

H. Conductors shall be continuous between cabinets, outlets and/or junction boxes; no splices or taps shall be made within the raceway itself. Under no circumstances shall feeder conductors be spliced.

I. At least six inches (150 mm) of free conductors shall be left at each outlet, cabinet, junction box, etc. where they are connected or spliced.

J. Wiring devices shall not be used as splices; pigtails (line, neutral and grounding) from circuit wiring shall be provided to allow removal of the device without opening the circuit.

K. Wiring in cabinets shall be neatly laced or tied.

L. Provide a grounded circuit conductor (neutral) to all wall switch locations.

3.02 TESTING

A. Feeders shall be checked using a megohm tester to determine the insulation resistance levels prior to energizing.

B. Branch circuits shall be tested to ensure electrical continuity and to ensure the system is free of short-circuits.

C. Provide a report indicating test results.

END OF SECTION
260519

SECTION 260526
GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies general grounding and bonding requirements for all electrical installations.

1.02 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, “Basic Electrical Materials and Methods”, apply to this Section.

1.03 SUMMARY

A. All systems, circuits and equipment shall be grounded and bonded in accordance with Article 250 of the National Electrical Code and the requirements of these Specifications and the Drawings.

1.04 SUBMITTALS

A. In accordance with section Submittals and Division-26 Section, “Basic Electrical Materials and Methods”, the following shall be furnished:

1. Test Reports: Certified test reports of ground resistance.
2. Certifications: Two weeks prior to final inspection, deliver to the Owner six (6) copies of the certification that the materials and installation are in accordance with the drawings and specifications and have been properly installed.
3. Provide product data for all grounding and bonding components and accessories.

1.05 QUALITY ASSURANCE

A. All grounding components and accessories shall comply with and shall be installed in accordance with NFPA 70, Article 250 of the National Electrical Code, and applicable sections of UL Std 467, "Electrical Grounding and Bonding Equipment", and UL Std 869, "Electrical Service Equipment".

B. Grounding and bonding components and accessories shall be UL listed and labeled for the specific application for which they are being used.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING

A. Provide electrical grounding and bonding components and accessories including, but not limited to, cables and wires, connectors, terminals, jumpers and surge arresters as required for a complete installation.

B. Where more than one product meets the intended requirements, selection shall be at the discretion of the Installer.

C. Provide electrical insulating tape, heat-shrinkable tubing, welding materials, straps and jumpers as recommended by manufacturer's written instructions and in accordance with standard industry practices.

D. All below grade grounding connections shall be exothermic welds and splices and shall be by Caldweld or equal. All materials shall be supplied by one manufacturer to ensure compatibility.

2.02 GROUNDING CONDUCTORS

A. Provide a grounding conductor with green insulation.

B. General purpose insulating grounding conductors have insulation types as identified by the NEC and tested, certified, and labeled in accordance with UL Standards.

C. Non-insulated grounding conductors shall be bare, soft drawn, single or multiple strand annealed copper in wire gauges or sizes as shown on the drawings or consistent with the requirements of NEC Article 250.

2.03 GROUND RODS

A. Ground rods shall be copper clad, solid steel round bars, 3/4 inches (19 mm) in diameter and 20 feet (3 m) in length.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. All equipment, conduit systems, raceway systems, metallic enclosures of electrical devices, transformer frames and equipment, wiring devices and all metallic non-current carrying devices, etc. shall be completely grounded in accordance with the requirements of the National Electrical Code (latest edition).

B. Grounding conductors shall be installed within conduit and shall be sized in accordance with NEC Article 250.

C. Continuity of rigid steel raceways shall be insured by conduit hubs. All grounded neutral conductors shall be continuously identified. All grounding and bonding connections shall be solderless. All grounding and bonding connections to structural steel shall be exothermic welds. Ground fittings at

water system connections shall have rigid clamp jaws. Perforated grounding straps shall not be acceptable.

D. The secondary neutral conductor of transformers shall be continuous, identified throughout and grounded in an approved manner to the grounding electrode system. Conductor used to ground neutral conductor shall be sized in accordance with NEC Article 250.

E. Provide insulated grounding conductors for all feeders and branch circuits. Provide grounding blocks, terminals, etc. for connection of ground wires in all distribution equipment, outlets, junction boxes and utilization equipment.

F. Provide bonding for all metal piping systems and structural steel. Provide braided copper jumpers at valves, equipment, etc. Bonding shall be in accordance with NEC Article 250.

G. All grounding wire, lugs, jumpers and bus shall be copper except as specifically approved elsewhere in these Specifications.

H. Where parallel feeders are used, each raceway shall contain an equipment ground conductor sized in accordance with NEC Article 250 for the combined parallel circuit amperage.

I. Grounding electrode conductor shall be continuous and no splicing shall be allowed. Equipment grounding conductor splices shall be permitted in device boxes and pulling points, but should be minimized to keep ground resistance as low as possible.

J. Receptacles shall be bonded to their outlet boxes with #12 copper straps. Straps may be omitted if self-grounding devices are utilized.

3.02 TESTING

A. The ground resistance at the Main Service Entrance ATS ground buses shall not exceed 10 ohms.

B. The ground resistance at the Generator Wye Connection Ground connection shall not exceed 10 ohms.

C. The ground resistance at the Pad Mount Transformer Secondary Wye Ground Connections shall not exceed 10 ohms.

D. Certified test results shall be provided in accordance with the requirements of Division-26 Section, “Inspections, Testing and Start-up” of these Specifications.

END OF SECTION
260526

SECTION 260529
HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, “Basic Electrical Materials and Methods”, apply to this Section.

1.02 SUMMARY

A. Support all raceways, enclosures, cabinets, boxes, and related electrical equipment from the building structure as required by the NEC and as described in these Specifications.

B. Support all lighting fixtures as required by the NEC and as described in these Specifications.

1.03 SUBMITTALS

A. Provide product data for each type of manufactured supporting device.

B. Provide shop drawings for each type of fabricated supporting device.

1.04 QUALITY ASSURANCE

A. All components and the installation of all components shall comply with NFPA 70, "National Electrical Code," requirements.

B. All supporting devices shall be listed and labeled by UL, ETL, CSA or a Nationally Recognized Testing Laboratory (NRTL).

C. Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports and equipment mounting.

PART 2 - PRODUCTS

2.01 PROHIBITED MATERIALS

A. Nails, wires, perforated tape or plumber's tape are unacceptable for supporting or securing conduits.

2.02 MANUFACTURED SUPPORTING DEVICES

A. Supporting devices shall comply with manufacturer's standard design and construction, fabricated from standard materials in accordance with published

product information.

B. Supporting devices shall be protected with a zinc coating or with a similar corrosion resistant coating or treatment. Devices for use outdoors shall be hot-dip galvanized.

C. Raceways shall be supported using clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

D. Steel channels and associated support rods shall be selected to accommodate weight of associated raceway and wire.

E. Anchors shall be provided of adequate size to support the load and shall be compatible with the construction method encountered. Anchors shall be expansion or toggle bolt type.

2.03 FABRICATED SUPPORTING DEVICES

A. Pipe sleeves shall be fabricated from galvanized sheet steel or Schedule 40 galvanized steel pipe.

B. Sheet steel sleeves shall be round tube closed with snaplock, joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gauge steel: 3" (75 mm) and smaller, 20 gauge (1.0 mm); 4" to 6" (100 mm to 150 mm), 16 gauge (1.6 mm); over 6" (150 mm), 14 gauge (2.0 mm).

C. Steel brackets shall be fabricated from angles, channels and other standard shapes. Brackets shall be assembled using welds and/or machine bolts to form a rigid assembly.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instruction and following recognized industry practices to ensure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Install hangers, supports, clamps and attachments to support piping properly from building structure. Install supports within maximum spacing indicated by NEC or on drawings.

D. Individual conduits shall be secured with steel pipe straps or lay-in pipe

hangers.

E. Multiple runs of suspended conduit shall be supported from trapeze style hangers.

F. Multiple runs of conduit on ceiling or wall surfaces shall be mounted on flush or surface steel channels.

G. Ceiling support wires shall not be used for support of conduits.

H. Lighting fixtures shall be supported as recommended by the manufacturer.

I. Raceway supports shall be adequate to carry present and future load multiplied by a safety factor of at least four. In no case shall a support strength of less than 200 pounds (1380 kPa) be used.

J. Manufactured watertight and fire-rated seals shall be provided for sealing conduits and cables passing through sleeves in floors and fire-rated walls. Seals shall be fire-resistant rubber plugs or other materials specifically designed to provide a watertight seal and a UL listed fire-resistant rating which meets or exceeds the rating of the floor or wall.

K. Provide vibration isolators between enclosures of all vibration producing equipment, transformers, etc., and their supports or floor. Isolators shall be Mason Industrial type NK neoprene and cork sandwich or equal.

L. Supports are required within 3 feet (900 mm) of each outlet box, junction box, device box, cabinet, conduit body or other tubing terminations.

M. All junction boxes shall be supported from structure.

END OF SECTION
260529

SECTION 260533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Metal wireways and auxiliary gutters.
3. Boxes

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Section 271523 "Computer-Telephone Network”

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For raceways, wireways and fittings.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alflex Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. O-Z Gedney; a unit of General Signal.
4. Wheatland Tube Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. FMC: Comply with UL 1; zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: die cast.
    b. Type: compression.

3. Expansion Fittings: Steel to match conduit type, complying with UL 651, rated for environmental conditions were installed, and including flexible external bonding jumper.

H. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

I. Alternates

1. Alternate 1 -Level 2 Vehicle Chargers

2.2 BOXES AND ENCLOSURES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Erickson Electrical Equipment Company.
2. Hoffman.
3. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
4. O-Z/Gedney; a unit of General Signal.
5. RACO; a Hubbell Company.
6. Robroy Industries, Inc.; Enclosure Division.
7. Spring City Electrical Manufacturing Company.

8. Thomas & Betts Corporation

B. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

C. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

D. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

E. Alternates

1. Alternate 1 -Level 2 Vehicle Chargers

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed All areas below 14’: GRC. Raceway locations include the following:

a. Mechanical rooms up to 8ft above finished floor. Use of EMT above the 8ft is permitted
b. Vehicle Maintenance and Storage areas up to 14ft above finished floor. Use of EMT above the 14ft is permitted.

4. Exterior, above grade: GRC

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use compression, cast-metal fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Alternates

1. Alternate 1 -Level 2 Vehicle Chargers

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Support conduit within 12 inches of enclosures to which attached.

H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

K. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

M. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a

blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

P. Expansion-Joint Fittings:

1. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
2. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

Q. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

R. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 260500.

3.5 PROTECTION/PAINTING

1. Refer to section 260500 for high performance coating to be applied to all surfaces.

END OF SECTION 260533

SECTION 260543

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Type PVC raceways and fittings.
2. Fittings for conduit, tubing, and cable.
3. Solvent cements.
4. Duct accessories.
5. Duct sealing.

B. Related Requirements:
1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" s
2. Section 260553 "Identification for Electrical Systems" specifies underground-line warning tape and concrete cable routing markers (warning planks).

PART 2 - PRODUCTS

2.1 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651 and UL CCN DZYR.

B. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:
1. Dimensional Specifications: Schedule 80.
2. Acceptable Manufacturer’s
   a. Atkore
   b. JM Eagle
   c. Cantex
   d. Wheatland Tube
   e. Prime Conduit
   f. IPEX USA
3. Options:

   a. Minimum Trade Size: 3/4” or as specified on the design documents
   b. Markings: For use with maximum 90 deg C wire.

2.2 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2.3 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL CCN DWTT.
3. Sustainability Characteristics:

B. Solvent Cements for Type PVC Raceways and Fittings:

2.4 DUCT ACCESSORIES

A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.

2.5 DUCT SEALING

A. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Compound must be capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduit, conduit and duct coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals. Duct sealing compound must be removable without damaging ducts or cables.

B. Inflatable Duct-Sealing System: Wraparound inflatable bladder that seals ducts that are empty or containing conductors against air and water infiltration. System is suitable for use in steel, plastic, or concrete ducts and penetrations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in field. Notify Architect if there is conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.

3.2 SELECTION OF UNDERGROUND DUCTS

A. Duct for Electrical Feeders: **PVC-80 direct buried** unless otherwise indicated.

B. Duct for Electrical Branch Circuits: **PVC-80** direct buried unless otherwise indicated.

C. Stub-ups: **PVC-80**

3.3 SELECTION OF UNDERGROUND ENCLOSURES

3.4 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Restore area immediately after backfilling is completed

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."

E. Cut and patch existing pavement in path of underground duct, duct bank, and underground structures in accordance with "Cutting and Patching" Article in Section 017300 "Execution."

3.5 INSTALLATION OF DUCTS AND DUCT BANKS

A. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA TCB 2 for installation of underground ducts and duct banks.
2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

1. Where indicated on Drawings, install duct, spacers, and accessories into duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.

2. Steel raceway, bends, and fittings in single duct run or duct bank on Project must be of same type.
3. Slope: Pitch duct minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
4. Expansion and Deflection Fittings: Install expansion and deflection fitting in each duct in area of disturbed earth adjacent to manhole or handhole.
5. Install expansion fitting near center of straight line duct with calculated expansion of more than 3/4 inch (19 mm).
6. Curves and Bends:

    a. Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with minimum radius of **48 inch** both horizontally and vertically, at other locations unless otherwise indicated.
    b. Field bending must be in accordance with NFPA 70 minimum radii requirements, except bends over 45 degrees must be made with minimum radius of **48 inch.** Use only equipment specifically designed for material and size involved. Use PVC heating bender for bending PVC conduit.
    c. Duct must have maximum of 270 degrees of bends between pull points.

7. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane. Couple steel conduits to ducts with adapters designed for this purpose.

    a. Install insulated grounding bushings on steel raceway terminations that are less than 12 inch (300 mm) below grade or floor level and do not terminate in hubs.

8. Building Wall Penetrations: Make transition from underground duct to steel raceway at least 10 ft (3 m) outside building wall, without reducing duct line slope away from building and without forming trap in line. Use fittings manufactured for transition to steel raceway type installed. Install steel raceway penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
9. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15 psig (1.03 MPa) hydrostatic pressure.
10. Pulling Cord: Install 200 lbf (1000 N) test nylon cord in empty ducts.

11. Direct-Buried Duct and Duct Bank:

    a. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inch (150 mm) in nominal diameter.
    b. Width: Excavate trench **3 inch (75 mm)** wider than duct on each side.
    c. Depth: Install top of duct at least 24 inch below finished grade unless otherwise indicated.
    d. Place minimum 3 inch (75 mm) of sand as bed for duct. Place sand to minimum of 6 inch (150 mm) above top level of duct.
    e. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.

f. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than **four** spacers per 20 ft (6 m) of duct. Place spacers within 24 inch (600 mm) of duct ends. Stagger spacers approximately 6 inch (150 mm) between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

g. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inch (100 mm) over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.

12. Underground-Line Warning Tape: Bury nonconducting underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inch (300 mm) above concrete-encased duct and duct banks **and approximately 12 inch (300 mm) below grade**. Align tape parallel to and within 3 inch (75 mm) of centerline of duct bank. Provide additional warning tape for each 12 inch (300 mm) increment of duct-bank width over nominal 18 inch (450 mm). Space additional tapes 12 inch (300 mm) apart, horizontally across width of ducts.
13. Ground ducts and duct banks in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by the Engineer of Record or their designated designee.

B. Tests and Inspections:

1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.
2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide minimum 12 inch (300 mm) long mandrel equal to duct size minus 1/4 inch (6 mm). If obstructions are indicated, remove obstructions and retest.

C. Nonconforming Work:

1. Underground ducts, raceways, and structures will be considered defective if they do not pass tests and inspections.
2. Correct deficiencies and retest as specified above to demonstrate compliance.

D. Assemble and submit test and inspection reports.

END OF SECTION 260543

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Examine all other Sections of the Specifications for requirements that affect work under this Section whether or not such work is specifically mentioned in this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Identification for conductors.
2. Equipment identification labels.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

E. Alternates

1. Alternate 1 -Level 2 Vehicle Chargers

PART 2 - PRODUCTS

2.1 CONDUCTOR MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a black background. Minimum letter height shall be 3/8 inch (10 mm).

PART 3 - EXECUTION

3.1 APPLICATION

A. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

B. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Chargers.
c. Disconnect switches.
d. Dispensers.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification devices.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Colors for 208/120-V Circuits:

   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White
   e. Ground: Green

2. Colors for 480/277-V Circuits:

   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral: White
   e. Ground: Green

3. Colors for DC Circuits

   a. Plus: Red
   b. Negative: Black
   c. Ground: Green

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

END OF SECTION 260553

SECTION 260583
ELECTRICAL CONNECTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, “Basic Electrical Materials and Methods”, apply to this Section.

1.02 SUMMARY

A. The Contractor shall provide electrical connections to and between all equipment indicated on the Drawings and Schedules and in the Specifications.

B. Electrical connections shall be provided for, but not limited to, electrical heaters, lighting fixtures, motors, motor starters and controllers, electrical distribution equipment, and transformers.

C. Unless otherwise specified, the Contractor shall, under this Section, mount and align all starters, control devices, safety switches and other related equipment whether specified in this or other Sections of the specifications, except where such items are factory mounted on the driven equipment. The mounting and alignment of starters and control devices for the automatic temperature control system are included in the Sections in which the equipment is specified.

D. Unless otherwise specified, the Contractor shall, under this Section of the specifications, provide all wiring, including conduit, wire, junction boxes, disconnecting switches, overcurrent protection, etc., not specified elsewhere in this specification, to and between all motors, starters, control devices and related electrical equipment, whether specified in this or other Sections of this specification, except where such items are factory wired, as well as factory mounted on the driven equipment.

E. Unless otherwise specified, all wiring to motors, control equipment and related electrical equipment, shall be installed in conduits with flexible metal conduit connections utilized for final motor connections. Flexible conduits shall be large enough to accommodate motor feeder, ground conductors, and control wires, whether or not so indicated on the drawings. Flexible conduits shall be limited to a maximum length of 6'-0" (1800 mm - 0 mm).

F. The drawings are diagrammatic. It is imperative that the contractor obtain exact rough-in information for all equipment well in advance of actual installation to provide coordination for his and other trades.

1.03 SUBMITTALS

A. Submit product data for all materials and components used for electrical

connections.

1.04 QUALITY ASSURANCE

A. All materials and components and the installation of all materials and components shall comply with the requirements of the following standards:

1. NFPA 70 "National Electrical Code"
2. IEEE Standard 241 "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings"
3. Applicable standards of ANSI/IEEE and NEMA pertaining to the products and installation of products for electrical connections
4. UL Standard 486A "Wire Connectors and Soldering Lugs for Use with Copper Conductors"
5. All materials and components shall be listed and labeled by UL or ETL.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide all materials and components required for complete splices and terminations of all circuits. All wiring shall be spliced and terminated using lugs and/or terminal blocks, except as permitted elsewhere in these Specifications.

B. All splices in branch circuit wiring rated 600 volts and less, except as permitted elsewhere in these Specifications, shall be made using compression type lugs specifically designed for the type, size and rating of the conductor. The lugs shall be installed using a tool specifically designed for the purpose.

C. Splices in copper branch circuit wiring for sizes #12 and #10 AWG may be made with non-tool, pre-insulated, molded wire connectors with integral self-locking spring grip.

D. All terminations of feeders and branch circuit wiring rated 600 volts or less, except as noted elsewhere in these specifications, shall be made using mechanical clamp-type set-screw lugs. Lugs which incorporate direct contact between the set-screw and the conductor shall not be permitted.

E. Tapes:

1. Self-adhesive tapes shall be used to insulate conductor splices. Terminations shall be in conformance with the following standards:

a. 600 Volts, Nominal and Less: UL 510, ASTM D-2754, ASTM D-3005, and ASTM D-4388.
b. 600 Volts through 69 Kilo Volts: ASTM D-4388 and IEEE 48.

2. Vinyl plastic electrical tape shall be used for all terminations and splices of conductors for circuits of 600 volts nominal and less, except

terminations in motor terminal boxes, transformer terminations, lighting and all heat producing equipment terminations. Terminations of the equipment listed herein shall be insulated with pressure sensitive glass cloth tape.

3. Ethylene propylene rubber (EPR) high voltage insulating tapes with liner shall be used for all splices and terminations over 600 volts nominal. The tapes shall be included a standard component of the manufacturer's compiled high voltage splice termination kits. All splices and terminations of 15 kV cables shall be accomplished with high voltage splice and termination kits only.
4. Tapes and high voltage splice and termination kits shall be the standard product of 3M Corporation, Plymouth Rubber Company, Inc. or approved equivalent.

F. Special lugs may be required to accommodate the size and number of conductors shown on the Drawings. The Contractor shall verify lug requirements for all circuit breakers and equipment terminals and shall provide correct lugs as required.

G. Pre-insulated solderless ring or spade type crimp connectors and terminals shall be used for all alarm and control circuits.

H. All connectors and terminals shall be of the proper size and ampacity, material and type for the application and service.

I. Alternates
1. Alternate 1 -Level 2 Vehicle Chargers

2.02 RACEWAYS AND FITTINGS

A. The Contractor shall provide raceways and fittings of the types, sizes, and finish indicated for each type of service. Where the type of raceway is not specified, the Contractor shall provide and install a raceway of proper selection as determined by the installer to fulfill the wiring and equipment connection requirements and comply with NEC requirements for raceways.

B. All raceways and fittings and the installation of all raceways and fittings shall comply with the requirements of these Specifications.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor shall inspect the area where electrical connections are to be installed. The installation of electrical connections shall not be permitted until site conditions are satisfactory.

3.02 INSTALLATION

A. The Contractor shall install all electrical connections in accordance with the manufacturer's written instructions using recognized industry practices.

B. Power, control, and signal circuits shall be connected to equipment in accordance with the manufacturer's wiring diagrams. The Contractor shall be fully responsible for the correct termination and interface of all electrical connections.

C. Splices shall be insulated with tape which provides an insulation rating which meets or exceeds the insulation rating of the conductor. All outdoor splices shall be made watertight using tapes and sealants specifically designed and listed for outdoor applications.

D. Wiring devices shall not be used as splices.

E. Electrical connections shall be tightened in accordance with equipment manufacturer's published torque tightening values. The installer shall use proper tools which shall include torque screwdriver, torque wrench, and ratchet wrench with adjustable torque settings.

F. UL Standard 486A torque tightening values shall be used when manufacturer's published tightening values are not available.

3.03 TESTING

A. All electrical connections shall be tested to ensure electrical continuity and compliance with these Specifications.

B. The Contractor shall demonstrate to the Owner or Engineer that a random selection of electrical connections has been tightened in accordance with the manufacturer's published torque tightening values.

END OF SECTION
260583

SECTION 262200
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Low Voltage dry type transformers.

B. Related Sections:

1. Section “Basic Electrical Materials & Methods” for concrete pads, labeling, and other general requirements.
2. Section “Grounding & Bonding for Electrical Systems” for grounding and bonding requirements.
3. Section “Low Voltage Power Conductors and Cables” for 600V conductors.
4. Section “Raceways and Boxes” for conduit and raceway connections.

1.3 SUBMITTALS

A. Submittal Requirements of this section:

1. Low Voltage dry type transformers.

B. Provide submittal data for each product type.

1. To verify specifications have been met/exceeded.
2. Independent laboratory test data where requested.
3. Clearly indicate or state all options, etc.

C. Submit the following for each dry type transformer:

1. Overall dimensions.
2. Weight.

3. Winding materials.
4. Insulation materials and Class.
5. Bus and lug materials.
6. Capacity rating.
7. Primary and secondary voltages and phases.
8. Winding configurations, delta, wye, etc.
9. Wiring diagrams.
10. Efficiency at full and part loads.
11. Total watts lost to space (BtuH).
12. Temperature rise rating.
13. Tap quantities and ratings.
14. Sound ratings.
15. Efficiency ratings, compliant with NEMA TP-1 and DOE 2016.
16. Enclosure and NEMA rating.
17. UL Listing.

D. Submit the following for each drive isolation transformer, in addition to items required for standard dry type:

1. Manufacturer's harmonic load calculations for use with proposed motor or load.
2. Noise attenuation ratio.
3. Temperature rise rating at stated load.

E. Product Test Reports: Certified copies of manufacturer's design and routine factory tests required by the referenced standards.

1. Sound Level Test Reports: Certified copies of manufacturer's sound level tests applicable to equipment for this Project.

F. Closeout Submittals: Submit in accordance with the General Conditions and Division 01 requirements, Section "Common Work Results for Electrical", and as follows:

1. All post-installation inspection checklists.
2. Post installation load test results.
3. Preventative maintenance and testing schedule for each unit.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

B. Manufacturer/Vendor Requirements:

1. Coordinate the components of the system and their arrangements electrically and mechanically.
2. Manufacturer shall be experienced in manufacturing equipment of the types and capacities indicated that have a record of successful in-service performance for a minimum of 10 years.
3. Maintain, within 50 miles from site, a maintenance and service organization complete with parts inventory and repair facility. Service shall be available on a 24-hour basis.
4. Start up services and post installation tests, as specified.

C. Installation Quality: In accordance with recognized trade organizations and standards.

1.	ANSI	American National Standards Institute
2.	ASME	American Society of Mechanical Engineers
3.	ASTM	American Society for Testing and Materials
4.	IEEE	Institute of Electrical and Electronics Engineers
5.	IEEE C2	National Electrical Safety Code
6.	NEC	National Electrical Code
7.	NECA	National Electrical Contractor's Association "Standards of Installation."
8.	NEMA	National Equipment Manufacturers Association
9.	NESC	National Electrical Safety Code
10.	NETA	National Electrical Testing Association
11.	NFPA	National Fire Protection Association
12.	UL	Underwriter's Laboratories

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Provide all transportation of unit(s) to site.
2. Provide for rigging needed for unloading and setting into final position.

B. Storage and Protection:

1. Where unit is to be installed indoors, store in covered building or offsite to prevent exposure to weather, etc. until building is suitable for transformer installation.
2. Temporary Heating: Apply temporary heat according to manufacturer's

recommendations within the enclosure of each ventilated type unit throughout periods during which equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

1.6 SEQUENCING

A. General Sequencing:

1. Coordinate transformer installation with exterior and/or interior construction.
2. Provide for sub-grade or subslab rough-ins.
3. Coordinate construction of concrete pads with transformer locations.

B. Sequencing, Coordination, and Integration:

1. Provide positioning and unit rough-in such that required clearances are maintained after final installation of all finishes, surface treatments, ceilings, ducts, etc.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Available Manufacturers: Subject to compliance with requirements, provide a system by the named "Basis of Design" manufacturer, or a comparable product of one of the other following named manufacturers:

1. Low Voltage. Drive Isolation, Buck-Boost and Control Transformers:
   a. Square D/Schneider Electric (basis of design)
   b. General Electric
   c. Siemens
   d. Cutler-Hammer
   e. Sola/Hevi-Duti
   f. Olsun Electrics Corp.
   g. Acme Electric Corp.

2.2 MATERIALS

A. General:

1. Comply with NEMA Standard ST 20, "Dry-Type Transformers for General Applications."
2. Sound levels shall comply with NEMA Standard TR 1, "Transformers, Regulators, and Reactors" for dry type transformers.

3. Life expectancies as defined by ANSI/IEEE C57.96, “IEEE Guide for Loading Dry Type Distribution and Power Transformers.”
4. Design, manufacture and testing per ANSI, NEMA and IEEE.
5. Efficiency ratings shall meet or exceed:
   a. NEMA TP1
   b. Department of Energy – 10 CFR Part 431 - Energy Conservation Program: Energy Conservation Standards for Distribution Transformers; Final Rule (DOE 2016).

B. Finishes:

1. Indoor Units: Manufacturer's standard paint over corrosion-resistant pretreatment and primer.

C. Insulation:

1. Non-hygroscopic materials.
2. Self-extinguishing, non-flammable construction.

2.3 LOW VOLTAGE DRY TYPE TRANSFORMERS

A. Two-winding type, 3-phase units using 1 coil per phase in primary and secondary, unless noted otherwise on drawings.

B. General:

1. UL Listed, general purpose, 600 volt class.
2. 480 volt, 3 phase delta primary, unless noted.
3. 208/120 volts, 3 phase, grounded wye secondary, unless noted.
4. Self-cooled, two winding type with NEMA 2 drip proof enclosures.
5. Floor mounted, wall mounted, or suspended per drawings.
6. Internal rubber vibration isolation mounts to minimize noise.
7. Heavy gauge steel, primed and finished in ANSI 61 gray weather resistant enamel.
8. For all units not mounted directly on slab or concrete pad, provide a perforated metal bottom plate to prevent contact with exposed bus or lugs from below.
9. Efficiency ratings shall meet or exceed the requirements of NEMA TP-1.

C. Construction (3 kVA through 25 kVA):

1. Epoxy resin encapsulated.

2. Completely enclosed.
3. Class H insulation, 185°C rated for 115°C temperature rise over a 40°C ambient.
4. (4) 22% taps, two (2) taps FCAN and two (2) taps FCBN.

D. Construction (30 kVA and above):

1. Ventilated housing with epoxy laminated windings.
2. Class H insulation, 220°C rated for 150°C temperature rise over a 40°C ambient.
3. Temperature Rise:
   a. 150°C maximum rise above 40°C,
4. (6) 22% taps, two (2) taps FCAN and four (4) taps FCBN.
5. 30 kVA units and larger shall be constructed of self-extinguishing Class 1 materials.

E. Cores:

1. High grade, grain-oriented silicon steel.
2. Low hysteresis and eddy current losses.

F. Coils:

1. Aluminum or copper windings.
2. Impregnated with cured, non-hygroscopic epoxy resin.
3. Brazed or pressure connection of windings.

2.4 SOURCE QUALITY CONTROL:

A. Tests & Inspections: Manufacturer shall provide inspections and tests of transformers, as required by referenced standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Examine the conditions under which the equipment shall be delivered, installed, and operated. Make all allowances required for operation, access, and maintenance of the equipment, per Codes and manufacturers.

3.2 INSTALLATION

A. General Requirements:

1. Comply with all requirements of NFPA 70, National Electrical Code, Article 110 “Requirements for Electrical Installations,” and Article 450, “Transformers and Transformer Vaults.”
2. Install all equipment, as indicated.
3. Maintain minimum working space at live parts according to manufacturer’s written instructions and NEC.
4. Provide all required access space per NEC for controls, fuses and items requiring maintenance access.
5. Maintain all required clearances for cooling, per manufacturer, and as per NEC.

B. Rough-in:

1. Rough-in all underslab or below grade conduits, prior to setting transformers in place.
2. Coordinate exact stubups with proposed manufacturer’s equipment installation drawings and the work of other trades in this contract.

C. Make minor adjustments to locations to maintain required front working clearances and clearance above and below per NEC.

D. Floor Mounted Units:

1. Bolt to floor or concrete pad, with concrete anchors.
2. Rubber vibration isolation pads under mounting surfaces.
3. All wiring connections to use flexible metal conduit.
4. Mount a minimum of 6 inches from walls.

3.3 CONSTRUCTION

A. Grounding: Ground transformers, all equipment frames and enclosures per NEC and as specified in Section “Grounding & Bonding For Electrical Systems.”

B. Connections: Tighten all connectors, terminals, lugs, etc. including screws and bolts, in accordance with manufacturer’s published torque tightening values for connectors and bolts. Where manufacturer’s torque requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A, “Wire Connectors and Soldering Lugs for Use with Copper Conductors” and 486B, “Wire Connectors for Use with Aluminum Conductors.”

3.4 FIELD QUALITY CONTROL

A. General:

1. Perform inspections and testing to ensure installation complies with

Contract Documents, is operational within industry and manufacturer's tolerances, is adjusted to specific project parameters, and is suitable for energizing.

2. Acceptance Testing: Provide for acceptance testing of electrical equipment specified in this section, as follows, and as required in Section “Common Work For Electrical.”
3. Schedule tests and provide notification at least one week in advance of test commencement.
4. Provide a set of Contract Drawings to the testing agency, where applicable.
5. Provide manufacturer's installation and testing instructions to the testing agency, where applicable.
6. Provide complete shop drawing data on all equipment.
7. Provide written results of all tests. Include date, equipment ID, name of testing company and technician, and results of each individual test. Provide pass/fail indication for each test.

B. Pre-Testing Inspections:

1. Inspect accessible components for cleanliness, mechanical, and electrical integrity, for presence of damage or deterioration, and to ensure removal of temporary shipping bracing. Do not proceed with tests until deficiencies are corrected.
2. Inspect bolted electrical connections for tightness according to manufacturer's published torque values or, where not available, those of UL Standards 486A and 486B.

C. Acceptance Tests: Perform the following minimum tests according to the manufacturer's instructions and NETA recommendations. Conform to ANSI C57.12.91, “IEEE Standard Test Code for Dry-Type Distribution and Power Transformers” for dry-type units, test method, and data correction factors.

1. Ratio tests at rated voltage connection and all tap connections.
2. Polarity and phase-relation tests at rated voltage.
3. Applied potential tests.
4. Induced potential tests.
5. Temperature Correction:
6. No-load and excitation current at rated voltage.
7. A.C. over-potential test on all HV and LV windings.
8. Power Factor (Dielectric absorption) test, winding-winding and winding-ground. Polarization index test results shall be calculated and shown.

D. Test Failures: Compare test results with specified performance or manufacturer's data. Correct deficiencies identified by tests and retest. Remove and replace malfunctioning components with new, and retest.

E. Test Labeling: Upon satisfactory completion of tests for each transformer, attach a dated and signed "Satisfactory Test" label to the unit.

F. Infrared Scanning: Perform an infrared scan of the specified equipment two (2)

1. Use an infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Perform scan after transformer(s) has been energized for a minimum of 48 hours, and under full load for minimum of 60 minutes.
3. Prepare a certified report identifying equipment checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and rescanning observations after remedial action.
4. Provide color images on film or paper, showing each of the scanned objects. Image shall identify the equipment and object scanned, date, and shall include a color-coded scale with temperature ratings for each color.
5. Provide a scan of the following items:
   a. HV cable terminations and bus.
   b. Secondary cable terminations and bus.
   c. Tap changer and windings (if accessible).

3.5 ADJUSTING

A. Adjust transformer taps to provide optimum (nominal) voltage conditions at utilization equipment throughout the normal operating cycle of the facility. Record voltages and tap settings to submit with test results.

3.6 CLEANING

A. General:

1. Inspect interior and exterior of installed transformers.
2. Remove paint splatters and other spots, dirt, and debris.
3. Touch up scratches and mars of finish to match original finish.
4. Remove labels, stickers, and protective films, etc. from all enclosures.
5. Remove debris, insulation and wire clippings, dirt, etc. from interior of all equipment.
6. Remove dirt, debris, etc. from top of all equipment.

B. Finish Touch Up: After completing installation, cleaning, and testing, touch up

scratches and mars on finish to match original finish.

3.7 COMMISSIONING

A. This project includes Commissioning of selected systems and components. Provide for commissioning of the LV transformer(s), as required per Section "Commissioning of Electrical Systems", and the Commissioning Plan.

END OF SECTION 262200

SECTION 262416
PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, Basic Electrical Materials and Methods, apply to this Section.

B. Cabinets and enclosures shall conform to Division-26 Raceways & Boxes.

1.02 SUMMARY

A. Furnish and install panelboards, cabinets and boxes as indicated on the Drawings and as specified herein.

1.03 SUBMITTALS

A. Provide product data for all panelboards, enclosures, cabinets, overcurrent devices and accessories.

B. Provide time-current-characteristic curves for all phase overcurrent devices rated 100 amperes or more and for all ground fault protective devices.

1.04 QUALITY ASSURANCE

A. Panelboards shall be supplied and installed in strict conformance with NFPA 70, National Electrical Code.

B. Products supplied under this Section shall comply with applicable requirements of UL standards pertaining to panelboards, overcurrent devices, enclosures, and cabinets. Completed assemblies shall be UL listed and labeled.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. Panels shall be of the circuit breaker type, and shall have capacity and arrangement as shown on the panel schedules or one-line diagram.

B. Branch circuit breakers shall be bolt-on type and shall be of the ambient compensated, thermal magnetic type, which will provide inverse time delay overload, and instantaneous short circuit protection. Branch circuit breakers shall have one, two or three poles as designated on the panel schedule. No circuit breakers utilizing handle ties for two or three pole operation shall be acceptable. Voltage and current ratings shall be as indicated on the drawings.

C. Refer to panel schedules on drawings for exact circuit breaker arrangements and interrupting capacities. Provide circuit breakers UL listed as type HACR for air conditioning equipment branch circuits.

D. Main breakers and branch breakers shall have the same minimum ampere interrupting capacity. Series rating shall not be acceptable.

E. Provide a typewritten directory for each panel, placed inside the panel door. The directory shall list all rooms served by each breaker, using the "Owner's" room numbers. Directories shall be installed in a metal directory frame under glass or minimum 0.03 (.75 mm) inch thick clear non-yellowing plastic. Spares and spaces shall be written in pencil.

F. All circuit breakers which serve telephone and communication equipment, refrigerators, exit signs, emergency circuits, fire alarm, security, and other miscellaneous control devices shall be equipped with mechanical handle locking devices.

G. Each panel shall be equipped with a ground bus, adequate for feeder and branch circuit equipment grounding conductors; bonded to box.

H. Each panel and cabinet and the units comprising same shall bear the manufacturer's nameplate and the UL label. Panelboards used for service entrance equipment shall be UL Service Entrance rated/labeled.

I. All single-phase, three-wire panels shall be equipped with a fully rated neutral bar. The neutral bar shall be sized to accommodate oversized neutral conductors where oversized neutral conductors are indicated on the Drawings.

J. Panels 68 inches or less in height shall be installed with the top of the panel 6 feet above the finished floor. All panels shall be installed in accordance with NEC 404 and 408.

K. All bus shall be copper.

L. Cabinet and trim shall be of code gauge steel (minimum) with 4" (100 mm) (minimum) wiring gutter all around. All panelboards shall be equipped with a hinged, locking door and piano hinged trim. Two (2) keys shall be furnished with each cabinet, and all locks on all cabinets shall be keyed alike. Provide door-in- door panel cover. Ensure that doors swing the entire 180 degrees open.

M. Where panels occur adjacent to one another in finished spaces, cabinets and doors for each panel shall be of the same height.

N. Panelboards shall be painted with gray over rust preventive primer.

O. Alternates
   1. Alternate 1 -Level 2 Vehicle Chargers

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount panels in locations shown, making sure that code-required clearances exist.

B. Where cabinets cannot be set fully flush due to shallowness of partition, trim protruding sides with approved metal or hardwood molding, fastened to cabinet so as to conceal intersection of wall and cabinet.

C. If paint is damaged during shipping or installation, damaged portion shall be sanded smooth and entire panel repainted.

D. Provide five (5) spare 3/4" (19 mm) conduits stubbed into accessible ceiling spaces above and below each flush mounted panel.

E. Load Balancing: After substantial completion, but not more than 60 days after final acceptance, measure load balancing and make circuit changes.

1. Measure loads during periods of normal system loading (coordinate with Owner).
2. Perform load balancing circuit changes outside normal occupancy/working schedule of the Owner at time directed by Owner’s representative.
3. After circuit changes are completed, recheck loads during normal load period. Record all load readings before and after changes and submit test results.
4. Tolerance: Difference exceeding 20 percent between phases within a panelboard is not acceptable. Rebalance and recheck as necessary to meet this requirement.

END OF SECTION
262416

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings and Division-26 Section, Basic Electrical Materials and Methods, apply to this Section.

1.02 SUMMARY

A. The Contractor shall furnish and install all wiring devices indicated on the Drawings or specified herein.

1.03 SUBMITTALS

A. Provide product data for each type of wiring device specified.

1.04 QUALITY ASSURANCE

A. All products and the installation of all products shall comply with NFPA 70, "National Electrical Code."

B. Wiring devices shall be listed and labeled by UL and shall confirm to the latest UL and NEMA standards pertaining to wiring devices.

PART 2 - PRODUCTS

2.01 WIRING DEVICES

A. All wiring devices shall be Specification Grade.

B. Wiring devices shall be white in color unless otherwise indicated.

C. Convenience receptacles shall be duplex, grounding type, 20A, 2P, 3W, 125V, NEMA 5-20R, straight blade, nylon or high-strength thermoplastic material.

D. Convenience receptacles serving commercial kitchens (15 and 20 ampere branch circuits), bathrooms, toilets, garages, outdoor and wet locations, and construction sites shall be of the ground fault interrupter type, duplex, grounding type, 20A, 2P, 3W, 125V, NEMA 5-20R, straight blade, nylon or high-strength thermoplastic material.

E. Convenience receptacles located in wet locations shall be of the ground fault interrupter, weather resistant type, duplex, grounding type, 20A, 2P, 3W, 125V, NEMA 5-20R, straight blade, nylon or high-strength thermoplastic, corrosion resistant material.

F. Single throw toggle switches shall be quiet type rated 20A, 1P, 120/277 VAC.

G. Three-way toggle switches shall be quiet type rated 20A, 120/277 VAC. Switches shall be positive-action type and shall not permit a maintained neutral position.

H. Wall plates for switches, receptacles, etc. in indoor dry areas, shall be satin finish stainless steel Type 302 for concealed raceways; and zinc-coated sheet steel or cast metal having round or beveled edges, for exposed raceways. Install galvanized steel wallplates in unfinished spaces.

I. Alternates
1. Alternate 1 -Level 2 Vehicle Chargers

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting and installation of electrical boxes and wiring.

C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.

D. Install wiring devices after wiring work is completed.

E. Install wallplates after painting work is completed.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque indicating hand tool.

G. Protect installed components from damage. Replace damaged items prior to final acceptance.

H. Provide weatherproof, while-in-use covers for all receptacles located in wet locations.

3.02 TESTING

A. Prior to energizing circuits, test wiring for electrical continuity and short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six (6) times.

B. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations.

END OF SECTION 26726

SECTION 262816 – ENCLOSED SWITCHES & CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes molded-case circuit breakers in individual enclosures.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches

1.03 SUBMITTALS

A. Division-1 Sections.

B. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.04 QUALITY ASSURANCE

A. Circuit disconnects and motor disconnect switches and the installation of same shall comply with the requirements of NFPA 70, "National Electrical Code."

B. Circuit and motor disconnect switches shall be listed and labeled by UL.

PART 2 - PRODUCTS

2.01 CIRCUIT AND MOTOR DISCONNECT SWITCHES

A. Switches shall be constructed in accordance with the latest editions and revisions of NEMA Standard KS-1, Federal Specification W-S-685C, and Underwriters' Laboratories Standard 98.

B. Switches shall be fusible or non-fusible as indicated on the Drawings, or as required by the equipment served, horse-power rated, quick-make, quick-break, heavy-duty type with integral arc suppressors. The handle shall be part of the enclosure, not the cover.

C. Fused switches and fuses shall have a minimum integrated interrupting rating of 100,000 amperes RMS symmetrical.

D. Switches 800 amperes and larger shall be bolted pressure type.

E. Switches used for service entrance shall be service rated and bear the UL service entrance label.

F. Switches shall have general purpose surface mounted NEMA type 1 or 3R enclosures as indicated or required by locations. All enclosures shall be designed to permit padlocking in the "open/off" position.

G. Switches on 120/208-volt service shall be rated 240 volts.

H. Fused switches for motor applications shall be furnished with UL listed dual-element Class RK-1 time delay fuses rated 600 volts. Fuse current ratings shall be as indicated on the Drawings or in accordance with the motor manufacturer's recommendations when specific sizes are not specified on the Drawings.

I. All exterior mounted units shall be lockable.

J. Alternates
1. Alternate 1 -Level 2 Vehicle Chargers

PART 3 - EXECUTION

3.01 INSTALLATION

A. Height: 6 feet to operating handle.

B. Locate and install engraved plastic nameplates in accordance with Division-26 Section, “Basic Electrical Materials and Methods.”

C. Switches shall be coordinated with the equipment to provide switches to suit the particular equipment characteristics and requirements.

D. Provide fusible switches for all equipment labeled for and/or requiring fuse protection.

E. Switches shall be installed in accordance with manufacturer's published instructions.

F. Provide three (3) spare fuses of each type and rating furnished for this project. Deliver spare fuses to the Owner's place of storage.

G. On the exterior, mount disconnect switches at 72” AFG UON.

3.02 FIELD QUALITY CONTROL

A. Inspect and test in accordance with National Electrical Testing Association (NETA).

3.03 TESTING

A. Prior to energizing circuits and switches, test wiring for electrical continuity and short-circuits.

END OF SECTION
262816

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included: This Section specifies the following items:

1. Cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures and finishes for the following applications:
    a. Mat foundations
    b. Slabs: Including but not limited to, slabs-on-grade, approach slabs, topping slabs, and other slab types
    c. Concrete toppings
    d. Cutting and patching of mechanical and electrical penetrations through cast-in-place concrete
    e. Miscellaneous cast-in-place concrete item of varying types including but not limited to: ramps, service pits, stairs and landings, pans, steps, concrete encasements, pole supports, corbels, haunches and other miscellaneous elements
    f. Concrete pavement
2. Cast-in-place concrete with Integral Crystalline Waterproofing Admixture System: Furnish all materials, services, application instructions, testing guidelines, quality control requirements and supervision necessary for the supply and installation of crystalline integral waterproofing admixture in concrete. Add the crystalline waterproofing admixture to the concrete mixture at the time of batching. Design, batch, place, finish and cure concrete in accordance with the guidelines set out by the American Concrete Institute and the recommendations of the manufacturer written instructions

B. Related Work: The following items are not included in this Section and shall be performed under the designated Sections:

1. Section 321723 – PAVEMENT MARKINGS for furnishing and application of reflectorized pavement markings.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans and ground granulated blast-furnace slag; subject to compliance with requirements.

B. Mass Concrete requirements apply to the cast-in-place retaining wall, slabs, cap beams, bridge abutments and viaduct structures.

1. Concrete slabs, footings, cap beams, bridge abutment, viaducts structures and other structures with thickness greater than three feet (3’-0”) are considered mass concrete.
2. Mass concrete also includes concrete placements of other dimensions where measures must be taken to mitigate cracking caused by heat of hydration.

C. Concrete Paving Repair: All labor, materials, and equipment, including sawcutting, cement concrete, welded wire mesh, and reinforcing needed to complete permanent trench repairs in existing cement concrete pavement. Excavation of subgrade materials is not included in concrete paving repair but is described in Section 312000.

1.3 UNIT PRICES

A. A unit price for Concrete Paving Repair is included in the contract. The area of concrete paving repair actually installed (measured in square feet) will be paid for at the bid unit price.

1.4 SUBMITTALS

A. Product Data: Submit data for each type of product indicated, including but not limited to reinforcement, forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds.

1. Include descriptive data, catalog cuts, laboratory test reports and any other information necessary to show acceptable materials and confirm Contract compliance.

B. Design Mixtures: For each concrete mixture, submit proposed mix proportions and test results confirming mix meets requirements stated below. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Indicate amount of fly ash or slag in the mix minimum of 25% of fly ash or slag is required in conformance with Volume 2 Technical Provisions Exhibit 2I.
3. For mass concrete placements, submit a Temperature Control Plan. The temperature control plan shall follow the procedures outlined in Section 207 of the ACI Manual of Concrete Practice to formulate, implement, administer and monitor a temperature control plan, making adjustments as necessary to ensure compliance with the Contract Documents.
4. As a minimum the Temperature Control Plan shall include the following:
    a. Concrete mix design
    b. Duration and method of curing
    c. Procedures to control concrete temperatures at the time of placement
    d. Methods of controlling temperature differentials
    e. Temperature sensor types and locations
    f. Temperature monitoring and recording system
    g. Field measures to ensure conformance the maximum concrete temperature and temperature differential requirements
    h. Methods for crack control

C. Steel Reinforcement Shop Drawings: Submit steel reinforcement placing shop drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1. Indicate coordination requirements for reinforcement locations with requirements of structural steel, steel joists and steel deck.
2. Comply with ACI, “Manual of Standard Practice for Detailing Reinforced Concrete Structures”.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer licensed in the Commonwealth of Massachusetts detailing fabrication, assembly, and support of formwork

1. Submit complete and accurate shop drawings as required to adequately illustrate and control finished work. Show all dimensions, kind, type, quality of all material, applicable specification references, and all information as may be necessary to detail finished construction of work covered.
2. Shoring and Reshoring: Indicate proposed schedule and sequence of formwork removal, shoring removal, and installing and removing reshoring. Submit camber and shoring calculations.
3. Blockouts for Architectural Joint Systems: Indicate blockouts and coordination with architectural joint systems.

E. Concrete Placement: Submit the following:

1. Written Cold-Weather Placement Plan: The Cold-Weather Placement Plan shall include detailed procedures to protect concrete during cold weather placements. Submit the Cold-Weather Placement Plan prior to concrete placement. The plan shall include:
    a. Instructions for placing and protecting all concrete elements including but not limited to slabs on grade, walls, columns and elevated slabs
    b. Provisions for monitoring the concrete temperature during placement, curing and immediately after protection is removed
    c. Curing procedures to prevent undesirable drying of fresh concrete
    d. Delivery coordination of redi-mix concrete trucks to avoid delays in concrete delivery
2. Written Hot-Weather Placement Plan: The Hot-Weather Placement Plan shall include detailed procedures to protect concrete during hot weather concrete placements. Submit the Hot-Weather Placement Plan prior to concrete placement. The plan shall include:
    a. Instructions for placing and protecting all concrete elements to prevent rapid drying due to high temperature, low relative humidity and/or high wind velocity
    b. The concrete producer’s proposed methods of preventing the concrete from exceeding the maximum allowable temperature upon delivery
    c. Detailed description for the use of chilled water, cooled aggregate, substitution of shaved ice in batching concrete or combination of methods
    d. Detailed curing procedures including instructions to prevent drying-shrinkage cracking due to rapid loss of moisture as well as thermal cracking due to rapid temperature drop after placement
    e. Delivery coordination of redi-mix concrete trucks to avoid delays in concrete delivery
3. Written Mass Concrete Placement Plan

F. Reinforcement Placement: Comply with CRSI-WCRSI “Placing Reinforcing Bars”

G. Material Test Reports: For the following, submit a test report from a qualified testing agency, indicating compliance with requirements:

1. Aggregate Soundness Test Reports (ASTM C88).
2. Aggregate Staining Test Reports (ASTMC641).
3. Preliminary Design Mix reports (ACI 301).
4. Air Entrainment Test Reports (ASTM C260).

H. Material Certificates: For each of the following, submit material certification signed by manufacturers:

1. Cementitious materials
2. Admixtures
3. Form materials and form-release agents
4. Steel reinforcement and accessories
5. Fiber reinforcement
6. Waterstops
7. Curing compounds
8. Floor and slab treatments
9. Bonding agents
10. Adhesives
11. Vapor Barriers/ Retarders
12. Semirigid joint filler
13. Joint-filler strips
14. Repair materials

I. Submit floor surface flatness and levelness measurements to determine compliance with specified tolerances and requirements for applied finishes and materials, except as noted for slope to drains.

J. Submit for review and approval the name and qualifications of the proposed Independent Inspection and Testing Agency.

K. Submit field quality-control test and inspection reports.

L. Submit Minutes of pre-installation conference.

M. Samples: Provide 3 samples, minimum 36” round by 3” thick, for the Owner’s evaluation of appearance and workmanship for each location type. If samples are not accepted, provide additional rounds of samples until approval is received.

1.5 QUALITY CONTROL /QUALITY ASSURANCE

A. Manufacturer Qualifications: Furnish concrete from a plant experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment. Select a plant that has recently furnished specified concrete for a large project, or furnish

evidence of plant's capacity to produce and deliver concrete conforming to specified requirements at required rate and has laboratory capability to develop acceptable concrete mix designs and to control quality of concrete production, in accordance with a preapproved quality control plan.

B. The Contractor’s selected Independent Testing Agency is required to perform all Testing and Inspection Services, Concrete Plant Inspection and Field Control and record keeping.

C. The minimum number of test cylinders to be made for each class of concrete and for each placement shall be four for each 50 cubic yards or less and minimum of four extra cylinders for each additional 100 cubic yards or fraction thereof. When additional sets of test cylinders are required beyond the normal seven and twenty-eight day tests, each set shall consist of a minimum of two test cylinders.

D. Independent Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests are required be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests are required be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor is required to be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel".

G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 116R “Cement and Concrete Terminology”
2. ACI 207.1 “Guide to Mass Concrete”
3. ACI 211.1 “Selecting Proportions for Normal, Heavyweight, and Mass Concrete”
4. ACI 214 “Recommended Practice for Evaluation of Compression Test Results of Field Concrete”
5. ACI 117 "Specifications for Tolerances for Concrete Construction and Materials"
6. ACI 301 “Specifications for Structural Concrete for Buildings”
7. ACI 304 “Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete”
8. ACI 304.2R “Placing Concrete by Pumping Methods”
9. ACI 305 “Hot Weather Concreting”
10. ACI 306 “Cold Weather Concreting”
11. ACI 309 “Consolidation of Concrete”
12. ACI 311 “Recommended Practice for Concrete Inspection”
13. ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures”
14. ACI 318 “Building Code Requirements for Reinforced Concrete”

15. ACI 347 “Recommended Practice for Concrete Formwork”
16. ASTM C31 “Making and Curing Concrete Test Specimens in the Field”
17. ASTM C33 “Concrete Aggregates”
18. ASTM C39 “Compressive Strength of Cylindrical Concrete Specimens”
19. ASTM C40 “Organic Impurities in Fine Aggregates for Concrete”
20. ASTM C87 “Effect of Organic Impurities in Fine Aggregate on Strength of Mortar”
21. ASTM C88 “Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate”
22. ASTM C94 “Ready-Mixed Concrete”
23. ASTM C136 “Sieve Analysis of Fine and Coarse Aggregates”
24. ASTM C138 “Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete”
25. ASTM C143 “Slump of Hydraulic Cement Concrete”
26. ASTM C150 “Portland Cement”
27. ASTM C157 “Length Change of Hardened Hydraulic Cement Mortar and Concrete”
28. ASTM C173 “Air Content of Freshly Mixed Concrete by the Volumetric Method”

H. Construction Tolerances: Allowable deviations from as-designed or indicated dimensions and elevations - Do not allow adjacent units to have cumulative deviations:

1. Concrete Substrate Surfaces
   a. Slab to receive dry shake aggregate topping - Adjust to accommodate finished surface tolerances
   b. Variation of other substrate surfaces from indicated elevation: +/- ¼”
2. Variations in thickness of finished monolithic slabs: +/- ¼”
3. Concrete walkway dimensions: +/- ¼”.
4. Tops of slabs not otherwise specified: +/- ¼”
5. Variation from a 10’ straightedge placed in all directions on horizontal and inclined surfaces: ¼”
6. Level and grades of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines: 1/4” in 20’; do not exceed 1/2” in entire line.
7. Level and grade of slab soffits, beam soffits and arises: 1/4” in any 10’ length; 3/8” in any 20’ length; do not exceed 3/4” for entire surface
8. Thickness of slabs: + 1/4”, - 1/8”.
9. Elevation of bottom of slabs on grade: + zero, - has no minimum.
10. Position of linear building lines and distance from centerlines of columns, walls and partitions: 1/2”
11. Rise of steps: +/- 1/16” in consecutive steps; do not exceed +/- 1/8” in total flight
12. Tread of steps: +/- 1/8” in consecutive steps; do not exceed +/- 1/4” in total flight
13. Size and location of sleeves and floor openings: +/- 1/4”

14. Difference between diagonal dimensions of rectangular opening - Not more than two percent of sum of diagonal dimensions

15. Fill Concrete: 1/4” of required elevation with variation in slope or plane not to exceed 1/4” in ten feet

I. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

J. Pre-installation Conference: Conduct conference at Project site to address the following:
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent
   b. Independent testing agency responsible for concrete design mixtures
   c. Ready-mix concrete manufacturer
   d. Concrete subcontractor
2. Review testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor barrier/retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection

K. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: Shall be American-made Portland Cement, free from water-soluble salts or alkalis which may cause efflorescence on exposed surfaces. Portland Cement shall be Type II, ASTM C 150 except as noted for Mass Concrete. Sulfate-resistant cement shall be Type V. Use only one brand of cement for each type of concrete throughout project. Contractor shall be responsible for whatever steps are necessary to insure that no visual variations in color shall result in exposed concrete and shall place on order and secure in advance a sufficient quantity of this (these) cement(s) to complete concrete work specified herein.

1. Fly Ash: ASTM C 618, Type F 15-35%

2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120, 25-50%

3. A minimum of 25% of fly ash or slag is required in conformance with Volume 2 Technical Provisions Exhibit 2I Additional Project Requirements.

Maximum water/cement ratio shall conform to the following requirements:

1. All slabs; 0.40

B. Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C 33 and the following additional requirements:

Sieve	Percent Passing
#4	95-100 (typical)
#16	50-85
#50	5-30
#100	0-10
Fineness Modulus	2.80 (Plus/Minus 0.20)
Organic	Plate 2 maximum
Silt	2.0 percent maximum
Mortar Strength	100 percent minimum compression ratio
Soundness	15 percent maximum loss, magnesium sulfate, five cycles

C. Normal Weight Coarse Aggregate: Shall be well graded crushed stone or washed gravel conforming to ASTM C 33 and the following additional requirements:

Designated Size (inches)	3	2	1-1/2	1	3/4	1/2	3/8
F.M. (+/-0.20)	7.95	7.45	7.20	6.95	6.70	6.10	5.80

Organic	Plate 1 maximum
Silt	1.0 percent maximum
Soundness	5 percent maximum loss, magnesium sulfate, five cycles

D. Maximum designated sizes for normal weight coarse aggregate used in concrete sections shall conform to the requirements of ACI 211.1, except that sizes shall also be chosen in conjunction with required clearances and methods of placement.

E. Concrete Fill for Steel Stair and Landing Pans: Composed of 1:2:2 mix with three-eighths inch maximum size normal weight aggregate and shall be placed with a 0” to 1” slump.

F. Water: From approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material and complying with the requirements of ASTM C 94.

G. Admixtures:

1. Water-reducing agent conforming to ASTM C494 Type A:
   a. "WRDA" - W.R. Grace & Co.
   b. "PDA25" - Protex Industries, Inc.
   c. "Pozzolith 344H" - Master Builder's Co.

d. Or approved equivalent

e. Note: Water-reducing agent shall be by same manufacturer as air-entraining agent.

2. Air-entraining agent conforming to ASTM C260:

a. "DAREX AEA" - W.R. Grace & Co.

b. "PROTEX AEA" - Protex Industries

c. "MB-VR" or "MB-AE" - Master Builder's Co.

d. Or approved equivalent

3. Superplasticizer: High-range water-reducer conforming to ASTM C 494 / C 494M, Type A or Type F. ASTM C1017 Type I plasticizing selected to best meet application.

a. “ADVA CAST 575” – W.R. Grace & Co.

b. “"PLASTIFLOW R” – Nox-crete

c. “MasterGlenium 3400” – BASF US (Master Builders Solutions)

4. Corrosion inhibitor: Calcium Nitrite with a typical dosage rate of 3 gallons per cubic yard. For viaduct elements located within the detention pond use a dosage rate of 5 gallons per cubic yard. Calcium nitrite mix designs shall take into account the effect on concrete set times. Corrosion inhibiters shall be used on areas exposed to deicing salts, such as platforms, as called out in the Contractor’s accepted Shop Drawings

5. Fiber Reinforcement: Synthetic Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

2.2 CONCRETE MIXTURES

A. Design, on the basis of trial mixes and strength curves specified below, mixes for each type and strength of concrete. The Testing Agency shall verify that the proposed mix designs conform to all specification requirements.

B. Mixtures used for cement concrete pavement shall be high early strength concrete conforming to Section M4.06.3 of the MassDOT Standard Specifications.

C. Furnish sufficient materials for concrete mix design not less than five weeks before use. Duplicate small samples plainly and neatly labeled with source, where proposed to be used, date, and name of collector shall be provided and presented to Testing Agency for permanent reference.

D. Design concrete mixes in accordance with "Method 1" of ACI 301, and the requirements of this Section. All concrete is normal weight unless specifically designated otherwise; air-dry weight not to exceed 150 lbs. per cubic foot.

E. All structural concrete shall be normal weight and have a minimum 28-day compressive strength of 5,000 psi and a maximum 28-day compressive strength of 6,000 psi. The Contractor may propose the use of higher strength concretes when feasible.

F. Exterior concrete shall contain air-entraining admixture when tested to ASTM C 231 at the point of discharge from the truck mixer:

Aggregate Size	Air Content, %
1-1/2 in.	4.5 - 7.5
3/4 in.	5.0 - 8.0
3/8 in.	6.0 – 9.0

Tremie concrete to contain an Air Content of 4 +/-1.5 percent.

G. Furnish concrete to have the following slump, unless noted otherwise, when tested to ASTM C 143 at the point of discharge from the truck mixer:

Condition	Slump, inches
With Water-Reducing Agent	4-1/2 – 7
With High-Range W/R Agent	7-9
Without Water-Reducing Agent	2 - 5

H. Design concrete mixes for slabs, including slabs on grade, to have a mid-range water reducer and have a maximum slump of 6".

I. Design mix of concrete to be used in work shall correspond to following test strengths (TABLE A) obtained in laboratory trial mixtures.

TABLE A

Minimum Strength of Lab Trial Mixes (psi)

Design Trial Mix	Strength 7-days	Strength 28-days
4,000	3,400	5,200
5,000	4,200	6,200
5,000 (High Early Strength)	See Table M4.06.3-2	
6,000	5,100	7,500

J. Exposed concrete: Provide corrosion admixture, such as DCI as manufactured by Grace Products, added to the mix design at a rate as indicated in Article 2.1-H.4 at locations noted below:
1. Slabs and concrete on grade

2.3 FORM MATERIALS

A. Construct formwork to shapes, lines, and dimensions required, plumb and straight, secured and braced sufficiently rigid to prevent deformation under load, and sufficiently tight to prevent leakage, all in conformance with ACI Standard 347, "Recommended Practice for Concrete Formwork".

B. Formwork for exterior concrete exposed to public view shall be high-density plastic overlaid plywood, 3/4" minimum thickness; for concealed concrete shall be "Plyform" plywood, 5/8" minimum thickness.
1. Chamfer Strips: At architectural concrete as required by design, use half-inch PVC radius former by BoMetals, Inc. At all other locations, use three quarter-inch, 45 degree poplar wood strips, nailed six inches on center, and installed in inside corners of all forms.

C. Form Ties and Spreaders: Superior-ties by Superior Concrete Accessories, Ind.; or Sure-Grip Ties by Dayton Sure-Grip and Shore Co. Wire ties shall not be used. Ties for foundation walls shall be snap-ties or type specified above with removal cones and shall incorporate water seal washer. Ties shall be arranged in a symmetrical manner.
   1. Provide units that shall not leave any metal closer than 1-1/2" to finished exposed surface.
   2. Provide tie that, when removed, shall not leave holes larger than 1-inch diameter in concrete surface, tie shall not be used for columns or exterior fascias.

D. Form Release Agent: Crete-Lease 880-VOC-Xtra or Non-staining and non-emulsifiable type, or equal. Form release agent shall be biodegradable and shall not impart any stain to concrete nor interfere with adherence of any material to be applied to concrete surfaces.

E. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid-release agent that shall not bond with, stain, or adversely affect cast-in-place concrete surfaces and shall not impair subsequent surface or joint treatments of cast-in-place concrete.
   1. Available Manufacturer: Available product by manufacture that may be incorporated into the Work include, but are not limited to, the following:
      a. Greenstreak Group, Inc. or approved equal.

F. Form-Facing Panels for Exposed-Aggregate Finishes: Steel, glass-fiber-reinforced plastic, or other approved non-absorptive panel materials that shall provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

G. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

2.4 REINFORCEMENT AND ACCESSORIES

A. Reinforcing Steel Bars: Reinforcing bars shall be newly rolled billet steel conforming to ASTM A 615 Grade 60. Bars shall be bent cold.
   1. All reinforcing bars shall be epoxy-coated, in accordance with ASTM A775.

B. Reinforcing Steel Bars for Welding: Shall be newly rolled billet steel conforming to ASTM A706 Grade 60, uncoated. Bars shall be bent cold.

C. Welded Wire Fabric: Shall conform to ASTM A 185 for interior concrete and ASTM A884, Class A for exterior concrete.

D. Reinforcement Accessories: Shall conform to Product Standard PS7-766, National Bureau of Standards, Department of Commerce, Class C, as produced by Superior Concrete Accessories, Inc.; Dayton Sure-Grip Co.; or R.K.L. Building Specialties Co., Inc. Reinforcement accessories shall include spacers, chairs, ties, slab bolsters, clips, chair bars, and other devices for properly assembling, placing, spacing, supporting, and fastening reinforcement. Tie wire shall be galvanized, epoxy coated or stainless wire of sufficient strength for intended purpose, but not less than No. 18 gage. Metal supports shall be of such type as not to penetrate surface of formwork and show through surface of concrete. Provide epoxy coated supports for epoxy coated reinforcing steel. Accessories touching interior formed surfaces exposed to view shall have not less than 1/8" of plastic between metal and concrete surface. Plastic tips shall extend not less than 1/2" up on metal legs. Individual and continuous slab bolsters and chairs shall

be of type to suit various conditions encountered and shall be capable of supporting 300 pound load without damage or permanent distortion.

E. Mechanical Reinforcing Bar Splicers (Couplers): The completed splice, utilizing couplers, Dowel Bar Splicer and Dowel-In shall meet or exceed 125 percent of the yield of the reinforcing bars being spliced. Provide temporary plastic plugs in splicers, which shall be exposed for extended periods

2.5 MISCELLANEOUS MATERIALS

A. Grout: Non-Shrink, Non-Metallic Grout: factory pre-mixed grout product complying with U.S. Army Corps of Engineers Handbook CRD-C-62 1. Ready-to-use aggregate product requiring only addition of water at job site such as "Embeco Pre-mixed Grout" by Master Builder's; "Vibro-Foil Ready-Mixed" by W.R. Grace & Co.; or "Ferrolith G" by Sonneborn Building Products, Inc. Grout shall be easily workable and shall have no drying shrinkage at any age. Compressive strength of grout (2" x 2" cubes) shall not be less than 5000 psi at 7 days, and 7500 psi at 28 days.

B. Waterstops: Extruded virgin PVC containing no scrap or reclaimed material or pigment. Provide cross section as indicated, uniform along the length of the waterstop and symmetrical transversely so that the thickness at any given distance from either edge of the waterstop shall be uniform. The finished waterstop shall meet the requirements specified below for the average of five samples tested in each case. Report standard deviations of values in addition to averages. Condition and test samples in atmosphere of 73 (plus or minus 3) degrees F and 50 (plus or minus 10) percent relative humidity, except where other test conditions are specified.

1. Tensile strength, per ASTM D 638. Die IV-: 2000 psi, minimum
2. Ultimate elongation, per ASTM D 638. Die IV: 350 percent, minimum
3. Tear resistance, per ASTM D 624. Die B: 350 pounds per inch of thickness, minimum
4. Stiffness in flexure, samples reduced to 1/8-inch thickness, per ASTM D 747. 1/4” span: 600 psi. minimum
5. Low temperature brittleness samples reduced to 1/8-inch thickness, per ASTM D 746: no cracking, chipping, or sign of failure at minus 35 degrees F
6. Accelerated Extraction, samples reduced to 1/8-inch thickness, per Corps of Engineers CRDC-572: tensile strength, per ASTM D 412. Die C 1750 psi. minimum; ultimate elongation, per ASTM D 412. Die C: 300 percent, minimum.
7. Effect of Alkali, samples reduced to 1/8-inch thickness, per Corps of Engineers CRDC-572: Change in weight. 7 days: minus 0.10 to plus 0.25 percent; Change in weight. 30 days minus 0.10 to plus 0 25 percent; Change in hardness. 7 days. per ASTM D 2240. Shore A-2: plus or minus 5 points; Change in thickness. 30 days: plus or minus 1.0 percent.
8. Tensile strength of samples taken across site-made and factory-made splices, per ASTM D 638 Die I \1000 psi. minimum

C. Waterstop Grout: Where indicated on the drawings, provide continuous Waterstop Grout (Internal or External type as recommend by the manufacturer) and Waterstop Treatment system as manufactured by Kryton International Inc. or equal product.

D. Vapor Barrier/Retarder: Vapor Retarder: Minimum 15 mil polyethylene.

E. Membrane Curing Compound: ASTM C 309, Type 1. Product used shall be shown to be compatible with the later application of coatings. Curing compound shall not be used on any floor slab scheduled to receive an adhered floor finish.

F. Membrane Curing Compound for Architectural Concrete: Liquid membrane curing compound complying with AASHTO M148, Type 1D, except Type 2 if required to control temperature of mass concrete and hot weather concrete.

G. Sheet Curing Materials: Waterproof paper (regular or white), polyethylene film (clear or opaque white), and white burlap-polyethylene sheet complying with AASHTO M171.

H. Chemical Hardener: All exposed concrete floor slabs shall be hardened with three applications of fluosilicate chemical hardener followed by two applications of clear acrylic concrete sealer by Sonneborn Division, ChemRex Inc. “Lapidolith”; or equal products by W.R. Meadows Co. and Concrete Service Material Company or other manufacturers.

I. Penetrating Sealer: Monomeric alkyalkoxy silane sealer which has demonstrated penetrability into dry low permeability concrete to a minimum of 1/4”. Sealer shall have 20 to 25 percent solids when used on walls, and 40 to 50 percent solids when used on floors.

J. Epoxy Bonding Compound: ASTM C881, Type V for load bearing applications, Grade 1 Class A (if placement temperature is below 40F); Class B (if placement temperature is above 60F). Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces.

K. Epoxy Membrane Curing Compound/Concrete Sealer: The two- component, epoxy resin system shall act as a dual purpose material: A membrane compound for curing alone, plus a penetrating sealer. It shall provide protection for concrete exposed to de-icing salts, commercial acids and alkalis, gasoline, diesel fuel, and oil, and exposure to freeze/thaw cycles and to vehicular traffic. The epoxy resin compound shall be furnished in two components for combining immediately prior to use in accordance with the manufacturer's written instructions as specified herein. The components of the epoxy resin system shall conform to the following requirements.

1. Component A: Poly (2 hydroxypropylene, P'p, isopropylidenephenolate) condensed with 1 chlorepropoxirane such that the ox content is 4% in aralkyl and hydroxylated solvents. Component B: The amido amine condensate of the Diels Alder adduct of polyunsaturated acids dissolved in suitable solvents. Ratio of components (A to B): 1:1 by volume.
2. Properties of Mixed Material:
    a. Viscosity: 75 to 125 cP's at 75˚F
    b. Pot Life: 8 hours minimum at 75˚F
    c. Minimum Solids Content: 40 to 44% by weight
    d. Recoat Time: 24 hours maximum
    e. Dry Film Thickness: 2 to 3 mils per coat
    f. Color: Clear, White tint, gray tint
3. Properties of Cured Material:
    a. The cured system shall exhibit no evidence of amine blushing or sweating which may inhibit bond of subsequent coats.

b. When tested according to ASTM D 968, specimens of coating cured for 14 days at 75˚F shall exhibit an abrasion coefficient of at least 30 liters per mil.

c. When tested according to ASTM D 522, a 2 mil dry film thickness specimen cured for 14 days at 75˚ shall exceed 12% elongation when tested on the 1/4” mandrel.

d. Specimens cured for 14 days at 75˚F and immersed for 48 hours shall exhibit less than 1% water absorption by weight.

e. Water Retentivity shall not exceed 0.055 grams per square centimeter when tested according to ASTM C 156.

L. Compressible Filler: Closed Cell Foam Filler per MassDOT Standard Specifications for Highways and Bridges.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine all work prepared by others to receive work of this Section. Commencement of work shall be construed as complete acceptance of preparatory work by others.

1. Hold Point-A pre-placement inspection shall be performed by the Contractor prior to placing concrete to assure that placement prerequisites have been accomplished.

3.2 HANDLING, STORAGE, AND PROTECTION OF MATERIALS

A. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing ice. Remove improper and rejected materials immediately from point of use. Cover materials, including steel reinforcement and accessories, during construction period. Stockpile concrete constituents properly to assure uniformity throughout project.

3.3 ERECTION OF FORMWORK, SHORING AND RESHORING

A. Set and maintain formwork to insure complete concrete work within tolerance limits listed in ACI 347 latest edition, "Recommended Practice for Concrete Formwork", and with following additional requirements:

1. Maximum variations from plumb:

a. In surfaces of columns, walls and beams:

1. In any 10’ of length: 1/4”

2. Maximum for entire length: 1/2”

2. Maximum variations from established position in plan required by design:

a. Column: 1/2”

b. Walls: 3/4”

3. Variations in cross-sectional dimensions of columns and beams and in thickness of slabs and walls.

   a. Minus: 1/8”

   b. Plus: 1/4”

B. Before form materials can be re-used, surfaces that shall be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired and projecting nails withdrawn, as required in accordance with ACI 301 to return forms to acceptable surface condition. Re-use of form material shall be subject to acceptance by Owner.

C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of Article 1.4-I.

3.4 PLACING OF REINFORCEMENT

A. Reinforcement shall be placed in accordance with requirements of CRSI 93, "Recommended Practice for Placing Reinforcing Bars" and CRSI 93, "Recommended Practice for Placing Bar Supports" and with further requirements below.

B. Reinforcement shall be accurately placed as required by design and shall be firmly secured in position by wire ties, chairs, spacers, and hangers, each of type accepted by Owner.

C. Bending, welding or cutting reinforcement in field in any manner, is prohibited, unless specific approval for each case is given by Owner.

D. Reinforcement shall be continuous through construction joints unless otherwise required by design.

E. Reinforcement shall be spliced only in accordance with requirements of the design. Splices of reinforcement at points of maximum stress shall generally be avoided. Welded wire fabric shall lap six inches or one space plus two inches whichever is larger, and shall be wired together.

F. Hold Point - Before concrete is cast, check all reinforcement after it is placed to insure that reinforcement conforms requirements of the design and accepted Design Documents. The Owner shall be notified at least 36 hours prior to concrete placement and given opportunity to inspect completed reinforcement and formwork before concrete placement. Prior acceptance of shop drawings shall in no way limit Owner’s right to demand modifications or additions to reinforcement or accessories.

3.5 JOINTS

A. Construction and control joints required by design are mandatory and shall not be omitted.

B. Joints not required by design shall be placed to least impair strength of structure and shall be subject to acceptance of Owner.

C. Waterstops:

1. Protect waterstop from oil, dirt, concrete spatter, and damage, and leave clean to receive concrete forms. Exercise care during installation of waterstop to eliminate all possibilities that may cause

leakage. Ensure reinforcing bars and slip dowels shall not interfere with positioning of waterstop during Installation.

2. Install waterstops in accordance with manufacturer's recommendations and as indicated. Hold waterstops rigidly in place by extending through slots in keyways, by spilt bulkheads, by tying to reinforcing bars, or by such other adequate methods as are necessary to insure proper support and embedment during the concreting process. Secure waterstop between the last rib and the end of the waterstop when tying to reinforcing rods. Tie waterstop to reinforcing bars every 12 inches.

3. Install waterstop so that half of the ribs of the waterstop material are embedded in the concrete on each side of the joint. When installed in an expansion joint, exercise care in pouring so that the closed hollow center-bulb remains in the gap between the first and second pour, to allow for maximum elongation with minimum stress on the portion of the waterstop embedded in the concrete.

4. Install expansion joint material and a sealant in the joint, as indicated, to prevent foreign matter from accumulating in the joint area. When a sealant is used place a separator between the sealant and the waterstop to insure that both the waterstop and sealant best perform their respective functions.

5. Sweep horizontal joints prior to pour to insure that foreign matter does not interfere with direct contact between the waterstop and concrete.

6. Systematically and thoroughly vibrate concrete around waterstop to avoid honeycombs and voids in the concrete and to insure complete contact of waterstop to concrete.

7. For the second pour on horizontal sections, secure waterstops to forms and/or reinforcing bars to prevent excessive movement of the waterstop and to provide positive insurance against honeycombing or voids. Use a thicker waterstop, 3/8" or 1/2", for heavy pour or larger aggregate.

8. Where using split-ribbed waterstop spread open the split leg of the waterstop and nail it to the bulkhead between the last two ribs. Upon completion of the first pour and removal of the bulkhead, join the split leg together every 12" with hog rings and position it for the second pour.

9. PVC waterstop may be butt-spliced on the job with an electrical splicing iron or a hot air welding gun and vinyl welding rod in accordance with the manufacturer's instructions.

10. Do not drive nails through center of waterstop. Do not lap waterstop, splice joints. Do not embed center bulb in concrete. Position it in the center of the joint to insure freedom of movement. Do not secure waterstop except between the last rib and the end of the waterstop when tying to the reinforcing rod to hold in place for the pour. Where using split-ribbed waterstop, do not nail split legs to bulkhead adjacent to bulb.

D. Integral Waterproofing System (Crystalline Admixture, Waterstop Grout and Waterstop Treatment):

1. The Waterstop System, consisting of Waterstop Grout and Waterstop Treatment, shall be installed in all non-moving construction joints and shrinkage control joints, according to the applicable manufacturer written instructions of Waterstop System.

2. All pipe penetrations shall be treated as per the crystalline admixture manufacturer's recommendations.

3. After completion of pour, all tie-holes shall be treated as per the admixture manufacturer's recommendations. Application Instruction 5.31 — Waterproofing Tie Holes and Concrete Defects.

4. Follow the manufacturer's recommendations for storage and handling.

3.6 INSTALLATION OF EMBEDDED ITEMS

A. Conform to requirements of ACI 318, paragraph 6.3, "Conduits and Pipes Embedded in Concrete", and as specified below.

B. Install galvanized steel sleeves, galvanized embedded wall plates and similar items, furnished by other trades, at locations shown on the drawings.

C. Anchor bolts for column baseplates shall be galvanized and installed with templates provided.

1. Vertical alignment shall be maintained within one-sixteenth inches of the elevations shown on the Contract Drawings.
2. Horizontal alignment shall be maintained within one-eighth inches of the locations shown on the Contract Drawings.
3. Verify depth of embedment and bolt projection prior to placement of concrete.
4. Inspection shall be performed by a surveyor licensed in the Commonwealth of Massachusetts. Certify compliance with shop drawings.

D. Temperature Sensors for Mass Concrete

1. Install temperature sensors for each mass concrete placement as outlined in the Temperature Control Plan specified in Article 1.3B.3 of this Section.
2. Furnish to the Owner 8 1/2 x 11” record sketches showing dimensional temperature sensor locations in plan and section.

3.7 MIXING, CONSISTENCY, AND DELIVERY OF CONCRETE

A. Concrete shall be ready-mixed, produced by plant acceptable to Owner. Hand or site mixing shall not be done. Constituents, including admixtures except certain corrosion inhibitors and superplasticizers, shall be batched at central batch plant. Admixtures shall be premixed in solution form and dispensed as recommended by manufacturer.

B. Central plant and rolling stock equipment and methods shall conform to Truck Mixer and Agitator Standard of Truck Mixer Manufacturer's Bureau of National Ready-Mixed Concrete Association, and Contract Documents. Consistency of concrete at time of deposit shall be as per Article 2.2.

C. Ready mixed concrete shall be transported to site in watertight agitator or mixer trucks loaded not in excess of rated capacities. Discharge at site shall be within one and one-half hours after cement was first introduced into mix. Discard concrete not discharged within one and one-half hours and dispose of legally. Concrete with a temperature greater than 80 degrees F shall require the implementation of Hot Weather Placement Plan (per ACI 305). Central mixed concrete shall be plant mixed a minimum of five minutes. Agitation shall begin immediately after premixed concrete is placed in truck and shall continue without interruption until discharged. Transit mixed concrete shall be mixed at mixing speed for at least ten minutes immediately after charging truck followed by agitation without interruption until discharged. Concrete shall be furnished by a single plant unless accepted by the Owner in writing.

D. Retempering of concrete which has partially hardened, that is, mixing with or without additional cement, aggregates, or water, shall not be permitted.

3.8 PLACING CONCRETE

A. No concrete shall be placed until forms, reinforcing steel, pipes, conduits, sleeves, hangers, anchors, inserts, reglets, and other work required to be built into the concrete have been properly installed. Do not schedule concrete placements without prior acceptance of the Owner.

B. Remove water and foreign matter from forms and excavations and, except in freezing weather or as otherwise directed, thoroughly wet wood forms just prior to placing concrete. Place no concrete on frozen soil and provide adequate protection against frost action during freezing weather.

C. Before placing concrete, verify that subgrade preparation, installation of formwork, reinforcement, and embedded items is complete, and that required inspections have been performed. Concrete placement shall not proceed until the required inspection has verified the work related to subgrade preparation, formwork, reinforcing, embedded items, and other related work has been performed satisfactorily.

D. To secure full bond at construction joints, surfaces of concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials and laitance. Provide standard shear key-way or roughen surface to ¼” minimum amplitude with suitable tools such as chipping hammers or bush-hammer, and re-cleaned by stream of water or compressed air. Alternatively for horizontal construction joints above grade, the Contractor may use the natural roughness at top of pour within forms provided wall surface are patched to the satisfaction of the Owner.

E. Do not place concrete having slump outside of allowable slump range.

F. Do not add water to concrete during delivery, at Project site, or during placement, unless accepted in writing by the Owner. Only water withheld at the batching plant shall be added at the Project site upon the acceptance of the Owner. No other water may be added.

G. Do not add water to concrete after adding high-range water-reducing admixtures to mix.

H. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Deposit no partially hardened concrete. When concrete is conveyed by chutes, equipment shall be of such size and U-shaped design as to insure continuous flow in chute. Flat (coal) chutes shall not be employed. Chutes shall be of metal or metal lines and different portions shall have approximately same slope. Slope shall not be less than 25 degrees nor more than 45 degrees from horizontal and shall be such as to prevent segregation of ingredients. Discharge end of chute shall be provided with baffle plate or spout to prevent segregation. If discharge end of chute is more than five feet above surface of concrete in forms, spout shall be used, and lower and maintained as near surface of deposit as practicable. When operation is intermittent, chute shall discharge into hopper. Chute shall be thoroughly cleaned before and after each run and debris and any water used shall be discharged outside forms. Concrete shall not be allowed to flow horizontally over distances exceeding five feet.

I. Concrete shall be placed in such manner as to prevent segregation, and accumulations of hardened concrete on forms or reinforcement above mass of concrete being placed. To achieve this end, suitable hoppers, spouts with restricted outlets and tremies shall be used as required.

J. During and immediately after depositing, concrete shall be thoroughly compacted by means of internal type mechanical vibrators or other tools, or by spading to produce required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on only enough to produce homogeneity and optimum consolidation without permitting segregation of constituents or "pumping" of air. Vibrators used for normal weight concrete shall operate at speed at not less than 7,000

vpm and be of suitable capacity. Do not use vibrators to move concrete. Vibration shall be supplemented by proper wooden spade puddling to remove included bubbles and honeycomb adjacent to visible surfaces. At least one active vibrator shall be on hand for every 10 cubic yards of concrete placed per hour, plus one spare vibrator in addition to the active vibrators. Vibrators shall be operable and on site prior to starting placement.

K. Vertical lifts shall not exceed 18”es. Vibrate completely through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone pockets, honeycomb, and segregation.

L. Concrete shall be deposited continuously, and in layers of such thickness that no concrete shall be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within section. If section cannot be placed continuously between planned construction joints, as specified, field joint and additional reinforcement shall be introduced so as to preserve structural continuity. Owner shall be notified in any such case.

M. Deposit and consolidate concrete for floors, slabs, and toppings in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations. Place concrete at mid-span of beams and girders prior to placement at the member supports. The slab thicknesses are theoretical minimum thicknesses, which shall be maintained.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

N. Cold joints, particularly in exposed concrete, including "honeycomb", are unacceptable. If they occur in concrete surfaces exposed to view, Owner shall require that entire section in which blemish occurs be removed and replaced with new materials at Contractor's expense.

O. When placing exposed concrete walls or columns, strike corners of forms rapidly and repeatedly from outside along full height while depositing concrete and vibrating.

P. Chutes, hoppers, spouts, adjacent work, etc. shall be thoroughly cleaned before and after each run and water and debris shall be discharged outside form.

3.9 HOT WEATHER CONCRETE PLACEMENT

A. The Contractor shall be adequately prepared to protect the concrete from the adverse influence of hot weather before the placement of any concrete may begin. Placement of concrete when the air temperature exceeds 80° F, particularly when the work is exposed to direct sunlight, shall be done taking special precautions to avoid cracking of the concrete from rapid drying or setting. The concrete shall be placed in accordance with ACI 305, "Hot Weather Concreting" when hot-weather conditions exist.

B. Cool ingredients before mixing to maintain concrete temperature below 90° F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated into the total amount of mixing water.

C. Cover steel reinforcement with water-soaked burlap so steel temperature shall not exceed ambient air temperature immediately before embedding in concrete.

D. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. The temperature of the forms shall not exceed 100° F. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

E. If requested by the Contractor, deemed advisable by the Testing Agency, and accepted by the Owner, a retardant may be used to delay the initial set of the concrete.

F. Concrete shall be placed at a sufficient rate that cold joints are not formed by the rapid set of concrete.

G. Moist curing shall be applied as soon as possible after placement to inhibit the development of shrinkage cracks due to the rapid drying of the surface.

H. The specified requirements for curing shall be strictly adhered to.

I. When high temperatures, low humidity and dry winds create conditions which may produce plastic cracking (when the rate of evaporation exceeds 2 lbs. per sf. per hr.), the evaporation retarder specified may be required to be applied by spray one or more times during the finishing operation. Placing under these conditions should be reviewed by the Testing Agency prior to placing any concrete.

3.10 COLD WEATHER CONCRETE PLACEMENT

A. The Contractor shall be adequately prepared to protect the concrete from the adverse influence of cold weather before the placement of any concrete may begin. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. The concrete shall be placed in accordance with ACI 306, "Cold Weather Concreting" when cold-weather conditions exist.

B. When the average daily temperature falls below 50° F, special precautions shall be taken to assure adequate strength gain of the concrete.

C. When air temperature has fallen to or is expected to fall below 40° F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F and not more than 80° F at point of placement. The forms shall be prewarmed to at least 40° F to prevent the rapid cooling of the concrete by their contact, and shall be free of all ice and snow.

D. When heated materials are being used the water shall be combined with the aggregate in the mixer and the resulting temperature shall be below 90° F before cement is added to the mix.

E. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

F. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. After placement all concrete shall be maintained at a temperature of 50° F for at least seven days. If high early strength concrete is used, this time requirement may be reduced to three days.

H. All concrete shall be protected by the use of heated enclosures, which must be sufficiently strong and wind proof and within which adequate heaters are properly distributed to maintain all concrete at the required temperatures. Heaters shall not be allowed to locally heat or dry the concrete. Adequate fire precautions shall be maintained and sufficient ventilation shall be provided to dissipate the building of carbon dioxide or other gases detrimental to the development of strength and hardness at the exposed surface(s).

I. Only the specified non-corrosive, non-chloride accelerator may be used. Calcium chloride, thiocyanates, or admixtures containing more than 0.05% chloride ions are not permitted.

3.11 MASS CONCRETE PLACEMENT

A. Mass Concrete shall be placed in accordance with ACI 207.1 “Guide to Mass Concrete”.

1. Temperature of concrete at time of placement is limited to a maximum of 85 degrees F.
2. A combination of the mix design, components in the mix, methods of pre-cooling and post-cooling, if employed, and surface insulation, if used, shall limit the maximum concrete temperature and also the maximum temperature differential between any point in the interior of the concrete element and any surface of the concrete element, thereby preventing cracking.
3. During the period following placing the concrete, the temperature differential between interior and surface shall be limited to a maximum of 35 degrees F unless an analysis submitted under the Temperature Control Plan, required under Article 1.3.B.3 of this Section demonstrates through calculation that the element is sufficiently reinforced to prevent crack widths in excess of 0.012”es.
4. The maximum allowable temperature (peak heat of hydration) in any portion of the mass concrete shall not exceed 165 degrees F.
5. Mix designs shall achieve the required design strength without unnecessary increase in cement content. Such mix designs may result in slower strength gain than normal and are thus allowed to fall below the required strength test results at 28 Days provided the full strength is reached by 56 Days, and slab spans are not subjected to superimposed loads before the full strength is reached. No individual strength test result shall be below 3200 psi at 28 Days.
6. Pre-cooling may be used to prevent excessive heat build-up caused by heat of hydration. Acceptable means include use of chilled water; providing some mixing water in the form of chipped, shaved, or flaked ice; cooling the aggregate; and cooling the mix with liquid nitrogen prior to placing. Ice shall be completely melted in the mix prior to concrete arrival at the jobsite.
7. Post-cooling is acceptable if feasible within the parameters of the construction schedule. Piping within the concrete shall be non-corrosive, non-conductive, non-metallic, and the system shall be submitted for review of the Owner.
8. Regardless of methods used, install temperature sensing devices within the concrete in each placement as specified in Article 3.6D of this Section. The devices shall operate in the range of 32 degrees F to 212 degrees F with an accuracy of ±2 degrees F. The temperatures shall be recorded automatically by the Contractor. Transmit to Owner daily.
9. Provide adequate concrete delivery and suitable equipment to accomplish mass placements without segregation, and without formation of cold joints.

10. If the 165 degree F maximum allowable temperature or the allowable differential temperature has been exceeded, take immediate action to retard further temperature increases or further growth of the temperature differential.

11. The Owner may, at its sole discretion, direct that the concrete that has exceeded the temperature limits defined above be removed or otherwise mitigated at no additional cost to the Owner.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise required by design, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and Equipment.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as required by design. Screeds, tamps, and provide slip-resistant aggregate finish.

3.13 FINISHING OF UNFORMED CONCRETE SURFACES

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screened and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 30T1/4”30T in 1 direction.

1. Revise locations of scratch finish in subparagraph below to suit Project.

2. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Revise locations of float finish in subparagraph below to suit Project.
2. Apply float finish to surfaces to receive trowel finish and where concrete flatwork is to receive waterproofing membranes or setting beds for finished materials.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Revise locations of trowel finish in first subparagraph below to suit Project.

2. Apply a trowel finish to all concrete surfaces unless noted otherwise.

3. Finish surfaces to the following tolerances, according to 30TASTM E 115530T, for a randomly trafficked floor surface:
   a. Revise surface plane tolerances to suit Project. See Evaluations for description of F-number system. ACI 301 suggests that all residential floors and nonresidential floors less than 10,000 sq. ft. (929 sq. m) be measured by straightedge method and that other nonresidential floors be measured by F-number system.
   b. Select floor flatness and levelness values required for Project from four subparagraphs below, or revise values to suit type of floor. ACI 302.1R suggests values in first subparagraph be used for carpeted slabs; those in second and third, for thin floor coverings; and those in fourth, for very flat floors for high-speed forklifts, air pallets, and ice and roller rinks.
   c. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 27; and of levelness, F(L) 20; for slabs-on-grade.

4. Retain straightedge method in subparagraph below if deleting F-number system above.

5. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10’ long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4”.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 30T25 lb/100 sq. ft.30T of dampened slip-resistive aluminum granules over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.14 REPAIRING OF UNFORMED CONCRETE SURFACES

A. Repairs of concrete surfaces are not allowed below 40 degrees F without proper preheating of materials and substrate. Concrete repairs below 40 degrees F shall be allowed only if the repair material temperatures are maintained per manufacturer’s recommendations and if the substrate is tented and pre-conditioned to 40 degrees F and rising.

B. Tops of slabs and walls shall be repaired by using either same material as originally cast or by use of dry-pack material, as accepted by Owner. Areas affected shall be chipped back square and to depth of one inch minimum. Hole shall then be moistened with water for a minimum of two hours, followed by brush coat of 1/16 inch thick cement paste. Immediately plug hole with concrete, or with dry pack material consisting of 1:1.5 mixture of cement and concrete sand mixed slightly damp to touch. Hammer dry-pack into hole until dense, and excess paste appears on surface. Finish patch flush and to same

texture as surrounding concrete. For large repairs employ 1-1-2 mixture of cement, concrete sand and pea gravel at same dry-pack consistency.

3.15 CURING, SEALING AND PROTECTION

A. When concrete is placed at or below ambient air temperatures of 40 degrees F. or whenever in opinion of Owner, such or lower temperatures are likely to occur within 48 hours after placement of concrete, cold weather concreting procedures, according to ACI 306 and as specified herein, shall be followed. To this end, entire area affected shall be protected by adequate housing or covering, and heating. No salt, chemicals or other foreign materials shall be used in the mix to lower freezing point of concrete.

B. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.

C. Concrete shall be treated and protected immediately after concreting or cement finishing is completed, to provide continuous moist curing above 50 degrees F. for at least seven days, regardless of ambient air temperatures.

D. Curing compounds shall not be permitted for slab and beams.

E. Keep permanent temperature record showing date and outside temperature for concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to Owner.

F. Epoxy Curing Compounds/Hardener:

1. Apply the first coat of epoxy to the plastic concrete as soon as the bleed water has totally disappeared. This application shall serve a dual function: a membrane curing compound which shall retain 95% or more of the mixing water in the concrete for a minimum of seven days; and the first coat of a two-coat system to seal and protect the concrete.

2. After a minimum curing period of 30 days and before the structure is opened to general use, wash the concrete with cleaning and degreasing chemical solution applied in accordance with the manufacturer's instructions and as specified herein.

3. Prepare the cleaning solution in accordance with the manufacturer's instructions. Dampen concrete surface with water. Apply the prepared solution over the area to be cleaned using a soft fibered but densely filled brush. Allow the solution to remain on the surface for 3 to 5 minutes. Reapply the cleaning solution and scrub vigorously. Rinse with fresh water applied at a pressure of 400-800 psi and a volume of water per minute 5 - 10 gallons. Protect all non-masonry surfaces.

4. Allow concrete to dry a minimum of 24 hours and a maximum of 48 hours before application of the second coat of epoxy.

5. Pour equal quantities of Components 'A' and 'B' into a clean container. Mix thoroughly with a low speed electric drill equipped with a steel paddle. Keep individual components and mixed compound covered when material is not being used.

6. Application: Apply mixed epoxy compound in a uniform coat at the rate of approximately 200 sq. ft. per gallon. Mixed material may be sprayed with any equipment capable of spraying epoxy compounds, or it may be applied with a deep nap lamb's wool roller.

7. Protect surface against vehicular and pedestrian traffic during curing period (24 hours at 75˚F).

8. Final Coat - Broom Finish and Wood Float Finish: Concrete is totally sealed against contaminants and resists the attack of de-icing chemicals. It may be applied at any time after the concrete has cured a minimum of 30 days and before the structure is opened to general use. Apply the epoxy compound by spray or roller at the rate of 275 to 325 sq. ft. per gallon being careful to avoid puddles or uneven application. The concrete shall exhibit a uniform gloss indicating it is totally sealed. Any areas that are dull or flat are not totally sealed. Any areas that are dull or flat are not totally sealed and shall be given a third coat.

9. Final Coat - Steel Trowel Finish Concrete: Apply the second and final coat at any time after the concrete has cured a minimum of 30 days and before the structure is opened to general use. Apply mixed epoxy compound in a uniform coat at a rate not to exceed 200 sq. ft. per gallon. While the epoxy compound is still liquid, drop fine sand meeting the gradation requirements of ASTM C-109, vertically into the epoxy at a uniform rate of one lb. per sq. ft. Make sure entire epoxy surface is thoroughly covered. After epoxy has hardened so that it cannot be dented with a screwdriver, remove excess sand.

G. Concrete Sealer: Apply to bridge copings, beam sets, parapets, vehicle barriers, boatwalls portal flank walls and other concrete surfaces as required. Apply in accordance with manufacturer's instructions and the following:

1. Application of the sealer shall not alter the surface texture and shall be compatible with the use of surface finish coatings and caulkings. Surface shall dry to a tack-free condition in 4 hours or less.

2. Preparation process shall not cause any undue damage to the concrete surface, remove or alter the existing surface finish, or expose the coarse aggregate of the concrete.

3. Concrete sealer shall be used as supplied by the manufacturer and not altered in any way. Apply onto concrete surfaces at manufacturer's recommended rate of coverage.

4. Prevent the concrete sealer from coming in contact with open joints that have not yet been filled with joint sealant, so as to prevent any loss of bond of the joint sealant.

3.16 REMOVAL OF FORMWORK, SHORING AND RESHORING

A. Contractor shall be responsible for proper removal of formwork, shoring, and reshoring.

B. Forms shall be removed only after concrete has attained sufficient strength to support its own weight, construction loads to be placed thereon and lateral loads, without damage to structure or excessive deflection.

C. Forms and falsework shall not be removed unless the concrete has attained the minimum percentage compressive strength as listed in the following table:

Structural Member	Minimum Percent of Design Strength (fc)
1. Invert Slabs; Slabs and Beams on Grade	25
2. Free Standing Walls, Columns and Piers	40
3. Retaining Walls	50
4. Soffits of Beams, Slabs and Girders Less Than 20' Span	80

5.	Stairs	80
6.	Soffits of Beams, Slabs and Girders Greater Than 20’ Span	90
7.	Cantilevered Beams, Slabs and Girders	90

D. Acceptance for form removal shall be based on field-cured concrete cylinders tested by a lab selected by the Owner.

E. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

F. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for architectural concrete surfaces.

G. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.

1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage with eased edge on internal corners.
2. Do not use rust-stained steel form-facing material.

3.17 REPAIRING AND FINISHING OF FORMED CONCRETE SURFACES

A. In accordance with the provisions of ACI 301, Chapter 10, all concrete shall have "smooth form finish".

B. Intent of this Specification is to require forms, mixtures of concrete, and workmanship so that concrete surfaces shall require no patching, except for plugging of tie holes. However, where patching is acceptable to Owner, procedure described below shall be followed.

C. Defective concrete and honeycombed areas shall not be patched unless examined and acceptance is given by Owner. If such acceptance is received by Contractor, areas involved shall be chipped down square and at least one inch deep to sound concrete by means of cold chisels or pneumatic chipping hammers. If honeycomb exists around reinforcement, chip to provide clear space at least three-quarter inch wide all around steel to afford proper ultimate bond thereto. For areas less than one and one-half inches deep, patch shall be made in same manner as described above for filling unformed concrete surfaces, care being exercised to use crumbly-dry (nontrowelable) mixtures and to avoid sagging. Thicker repairs shall require build-up in successive days, each layer being applied as described. To aid strength and bonding of multiple layer repairs, non-shrink, non-metallic aggregate shall be used as an additive to the mixture in proportions as follows:

Materials	Volumes (proportions)	Weights (proportions)
Cement	1.0	1.0
Non-Metallic Aggregate	0.15	0.25
Sand	1.5	1.55

For very heavy (generally, formed) patches, pea gravel may be added to mixture and proportions modified as follows:

Materials	Volumes (proportions)	Weights (proportions)
Cement	1.0	1.0
Non-Metallic Aggregate	0.2	0.33
Sand	1.0	1.0
Pea Gravel	1.5	1.55

D. After hardening, rub lightly as described above for form tie holes.
   1. Mortar for patching shall be same mix as above except aggregate shall pass a No. 14 sieve.
   2. For all concrete to receive "smooth" finish, remove formwork fins and clean entire surface of grease, form oil, laitance, dust, and other foreign matter.
   3. "Smooth" finish shall consist of having all fins removed, joint marks smoothed off, blemishes removed, and surfaces left smooth and unmarred.
   4. Begin finishing operations as soon as practicable after removal of forms, continue with curing operations after finishing is completed. After concrete has been well cured, carefully inspect surfaces. Remove any fins, rough spots, streaks, hardened mortar or grout and other foreign material. Patch defects with finishing mortar as specified above, to satisfaction of Owner.

E. Patches which become crazed, cracked, or sound hollow upon tapping shall be removed and re-placed with new material at Contractor's expense.

3.18 CLEANING

A. Concrete surfaces shall be cleaned of objectionable stains as determined by the Owner. Materials containing acid in any form or methods which shall damage "skin" of concrete surfaces shall not be employed, except where otherwise specified.

PART 4 - MEASUREMENT & PAYMENT

4.1 MEASUREMENT

A. Concrete paving repair will be measured by the square foot in place for thicknesses up to 6”. If thicknesses greater than 6” are required, the measured area will be scaled by the actual thickness installed (in inches) divided by 6”.

4.2 PAYMENT

A. Concrete paving repair will be paid for at the contract unit prices per square foot. All labor, materials, and equipment, including sawcutting, reinforcing, and welded wire mesh will be considered incidental to the contract unit price. Excavation or backfill of subgrade materials below the concrete paving repair will be part of the base bid and not included in the unit price.

B. Any cast-in-place concrete work other than concrete paving repair will be considered incidental to the project and included in the base bid lump sum.

END OF SECTION 033000

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Removing above and below grade site improvements.
2. Demolition and removal of selected site elements and as required for new work. Refer to the Drawings for additional requirements.
3. Salvage of existing items to be reused or turned over to the facility.
4. Removal and legal disposal of demolished materials off site. Except those items specifically designated to be relocated, reused, or turned over to the facility, all existing removed materials, items, trash and debris shall become property of the Contractor and shall be completely removed from the site and legally disposed of at her/his expense. Salvage value belongs to the Contractor. On-site sale of materials is not permitted.
5. Demolition and removal work shall properly prepare for alteration work and new construction to be provided under the Contract.
6. Scheduling and sequencing operations without interrupting utilities serving occupied areas. If interruption is required, obtain written permission from the utility company and the PVTA Project Manager. Schedule interruption when the least amount of inconvenience will result.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 260502 – ELECTRICAL:
   a. Disconnecting, capping and otherwise making inactive existing electrical services in areas where demolition and removal work is required.
   b. Disconnect and reinstallation of electrical equipment temporarily interrupted

during construction.

2. Section 312000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
3. Section 312500 – EROSION AND SEDIMENATION CONTROLS for required erosion and sedimentation control measures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to the PVTA ready for reuse, at a location designated by the PVTA. Protect from weather until accepted by PVTA.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Protect from weather until reinstallation.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIAL OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques, antiques, and other items of interest or value to PVTA that may be encountered during selective demolition remain property of the Commonwealth or PVTA as applicable. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the PVTA Project Manger.

B. Except for materials indicated to remain the User Agency's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with early and late starting and finishing dates for each activity. Ensure PVTA's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other occupants affected by selective demolition operations.
4. Coordination of PVTA’s continuing occupancy of existing building.

B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged, and turned over to the PVTA.

C. Predemolition Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01. Submit before Work begins.

D. Landfill Records: Provide trip tickets (receipts) indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

E. Photographs sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

F. Record drawings, according to Section 017700 - CONTRACT CLOSEOUT identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Examination of Existing Conditions: The Contractor shall examine the Contract Drawings for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. The Contractor shall visit the site and examine the existing conditions as he finds them and shall inform herself/himself of the character, extent and type of demolition and removal work to be performed. Submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.

B. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Section 013100 - PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.8 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the PVTA Project Manager and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on User Agency's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until erosion and sedimentation control measures are in place.

E. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place or outside of the limit of work. Protect improvements on adjoining properties and on User Agency’s property.

1. Restore improvements damaged by Contractor’s clearing activities to their original condition, at no additional expense to the Commonwealth.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

B. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Designer.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction videotapes.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
2. Maintain adequate passage to and from all exits at all times. Before any work is done which significantly alters access or egress patterns, consult with the Designer and obtain approval of code required egress. Under no condition block or interfere with the free flow of people at legally required exits, or in any way alter the required condition of such exits.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Provide temporary barricades as required to limit access to demolition areas.
2. Protect existing site improvements, appurtenances, and landscaping to remain.

C. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

D. Protect and maintain benchmarks and survey control points from disturbance during construction.

E. Locate and clearly flag trees and vegetation to remain or to be relocated.

F. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to the PVTA Project Manager.

3.3 PROTECTION OF PUBLIC AND PROPERTY

A. Provide all measures required by federal, state and municipal laws, regulations, and ordinances for the protection of surrounding property, the public, workmen, and Commonwealth's employees during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes and temporary lighting.

B. Protect all walks, roads, streets, curbs, pavements, trees and plantings, on and off premises, and bear all costs for correcting such damage as directed by the Designer, and to the satisfaction of the PVTA Project Manager.

C. Demolition shall be performed in such a manner that will insure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other cause and so as not to cause interference with the use of other portions of the building, of adjacent buildings or the free access and safe passage to and from the same.

D. Every precaution shall be taken to protect against movement or settlement of the building, of adjacent buildings, structures, sidewalks, roads, streets, curbs and pavements. Provide and place at the Contractor's own expense, all necessary bracing and shoring in connection with demolition and removal work.

E. Provide and maintain in proper condition, suitable fire resistive dust barriers around areas where interior demolition and removal work is in progress. Dust barriers shall prevent the dust migration to adjacent areas. Remove dust barriers upon completion of major demolition and removal in the particular work area.

F. Protect unaltered portions of existing construction, including finishes, furnishings and equipment

G. Provide secure weather protection where demolition has removed a portion of the exterior envelope.

3.4 DISCOVERY OF HAZARDOUS MATERIALS

A. If hazardous materials, such as chemicals, asbestos-containing materials, or other hazardous materials are discovered during the course of the work, cease work in affected area only and immediately notify the Designer and the PVTA Project Manager of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Continue work in other areas.

B. If unmarked containers are discovered during the course of the work, cease work in the affected area only and immediately notify the Designer and the PVTA Project Manager of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Take immediate precautions to prohibit endangering the containers integrity. Continue work in other areas.

3.5 CUTTING

A. Perform all cutting of existing surfaces in a manner which will ensure a minimal difference between the cut area and new materials when patched. Use extreme care when cutting existing surfaces containing concealed utility lines which are indicated to remain and bear full responsibility for repairing or replacement of all such utilities that are accidentally damaged.

B. Provide a flush saw cut edge where pavement, curb and concrete removals abut new construction work or existing surfaces to remain undisturbed.

3.6 BLASTING

A. No blasting will be permitted on this project.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Comply with requirements of Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL and the following.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Premises shall be left in a clean condition and ready to accept alteration work and new construction.

3.9 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.10 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off the User Agency's property.

1. Burning on site is prohibited.
2. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Preparing subgrades for buildings, structures and landscaping.
2. Excavating and backfilling for buildings and structures.
3. Removal of underground utilities as applicable.
4. Drainage course for slabs-on-grade.
5. Subbase course for concrete pavements.
6. Subbase and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling for utility trenches.
9. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
10. Removal of items covered by Section 012200 - UNIT PRICES as applicable.
11. Coordination with maintenance of safe path of travel for the public.
12. Evaluation of soils to be excavated as an Environmentally Managed Soil.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Site Conditions: The project site is a MA DEP Bureau of Waste Site Cleanup site ID 1-1063. Site Soils classifications include S-3/GW-2 and S-3/GW-3.

F. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 033000 - CAST-IN-PLACE CONCRETE for granular course if placed over vapor retarder and beneath the slab-on-grade.
2. Section 311000 - SITE CLEARING for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements.
3. Section 312319 - DEWATERING for dewatering of trenches and excavations.

4. Section 312500 - EROSION AND SEDIMENTATION CONTROLS for temporary erosion and sedimentation control measures.
5. Section 315000 - EXCAVATION SUPPORT AND PROTECTION for shoring and bracing.
6. Division 02, 22, 23, and 26 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

1.3 UNIT PRICES

A. Unit prices for certain types of earthwork are included in Section 012200 - UNIT PRICES.

B. Rock Measurement: Volume of rock actually removed, measured in original position. Unit prices for rock excavation include replacement with approved materials.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and 12-inches over pipe in a trench including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench to approximately the gravel subbase layer.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Designer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Designer. Unauthorized excavation, as well as remedial work directed by Designer, shall be without additional compensation.

G. Environmentally Managed Soil: Soil material tested and found to be contaminated with regulated compounds and/or hazardous waste requiring treatment and/or removal offsite as outlined by 310 CMR 40.0000 Massachusetts Contingency Plan (MCP).

H. Fill: Soil materials used to raise existing grades.

I. Fill (Historic Fill): In-situ material known as Fill, also known as historic fill or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with historic fill includes, but are not limited to glass, brick, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials which would preclude the disposal of the urban fill as daily cover at a landfill. Material containing less than 10%, by volume, solid waste/debris, as determined by the Designer, shall be classified as historic fill. Material that contains 10% or more solid waste/debris by volume, as determined by the Designer, shall be classified as solid waste.

J. Obstructions: Parts of old foundations and other structures, including but not limited to, granite blocks, mass concrete, steel, former and existing utilities, concrete foundations, railroad ties, cobblestones, flood slabs, wood piles and other obstructions which may interfere with new foundation or utility locations and require removal shall be classified as obstructions.

K. Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix.

L. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted.

M. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

N. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

O. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

P. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Geotextile.

3. Controlled low-strength material, including design mixture.

B. Material Test Reports: From a qualified testing agency for each on-site and imported fill soil material proposed for fill and backfill for review by the Engineer at least one (1) week prior to use of the material indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487.
2. Modified Proctor laboratory compaction curve according to ASTM D 1557.
3. Grain size analysis performed in accordance with ASTM D6913 or ASTMD7928 depending on the soil gradation
   During Construction, submit written confirmation of fill lift thickness, in-place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations or structures.

C. Qualifications for Approving Source: Prior to earthwork operations, submit the qualifications of the persons or Agency approving the source of supply of materials and control testing and inspection.

D. Earthwork Operations: Submit, prior to the excavation of earthwork activities, a plan describing the earthwork operations including the frequency and locations of tests and inspections. No work shall be performed until this plan has been approved by the Designer.

E. Supply and Control Inspection Results: Submit the results of all sources of supply and control inspections and tests. Submittals reviewed beyond the second rejection (or required submittal) shall be provided at no cost to the PVTA and shall be reviewed by the Designer at the Contractor's expense. No work shall be performed until the Engineer has approved the source of supply.

F. Material Handling: At least two weeks prior to the start of any excavation activity submit, in writing, the following for review and shall not start excavation activity until the entire submittal is acceptable to the Engineer.

1. Description of the method of dewatering excavated material and control of effluent water quality.

2. Description of the method of dewatering environmentally managed excavated material and control of effluent water quality.
3. Identification of a licensed hauler and disposal facility for possible vacuum collection, trucking and disposal of contaminated aqueous liquids.
4. Identification of a licensed hauler and disposal facility for possible vacuum collection, trucking and disposal of contaminated excavated soils.
5. Locations and methods of excavating, handling, and stockpiling (if applicable) excavated material, including drainage, as specified in this Section. Describe methods to keep materials from various sources separated during stockpiling operations (if applicable).

G. Import Backfill Materials Certification: A certification statement and analytical results shall accompany each physical sample of earth materials to be imported onto the site, including but not limited to loam, bedding sand, gravel sub-base, common fill and structural backfill. At a minimum the certification shall state the point of origin and that the material is free of

contaminants. The certification shall include representative sample analysis from each point of origin of backfill to be used on the site. The sample(s) shall be analyzed by a certified laboratory for total metals (MCP 14 metals), volatile organic compounds (EPA Method 8260), semi-volatile organic compounds (EPA Method 8270), petroleum hydrocarbons (EPA Method 8100), and Total PCBs and pesticides (EPA Method 8081 and 8082). On-site soils defined as suitable for reuse can be used as backfill without providing the certification required above.

H. Submit additional geotechnical and analytical test data and certifications for every 1000 cubic yards of material imported or reused on-site or anytime consistency of material changes in the opinion of the Designer. Submit associated chemical laboratory data on the imported materials throughout the course of the Work, if requested by the Designer, to evaluate the consistency of the source or process, at no additional cost to the Owner.

I. Pre-excavation Photographs and Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins. Maintain catalog of up-to-date photographs at the site.

J. Plan to Maintain Safe Path of Travel: Submit plans for maintaining safe paths of travel for the general public during the entire project, including requirement for police details of necessary.

K. Delegated-Design Submittal: For site and work location indicating earthwork will not disturb environmentally managed soils and or provisions for management of soils in accordance with the MCP by a Licensed Site Professional in the Commonwealth of Massachusetts.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the PVTA Project Manager or others unless permitted in writing by Designer and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify the PVTA Project Manager not less than seven days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the PVTA Project Manager's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Contractor shall perform as many additional exploratory excavations as necessary to verify subsurface conditions, including the presence of hazardous substances and materials as defined in 310 CMR 30.00 Hazardous Waste, and groundwater levels at time of construction.

D. MassDEP Bureau of Waste Site Cleanup (BWSC) Monitoring: This project site is listed as a hazardous materials site under the MassDEP BWSC with Release tracking # (ID-1-1063). Soil on site has been classified as S-3/GW-2 and S-3/GW-3.Remedial actions and monitoring are ongoing and expected to take place during Project construction activities.

1. The Contractor is responsible for ensuring all work is done in compliance with the requirements outlined in the MCP.
2. The Contractor is responsible for coordinating Project work with the PVTA Licensed Site Professional (LSP).

1.7 QUALITY ASSURANCE

A. The PVTA reserves the right to perform inspections and testing at any time during the execution of work.

B. When rework or replacement of soils are required to achieve compaction, PVTA may conduct confirmatory testing.

1.8 QUALITY CONTROL

A. The Contractor shall assume full responsibility for control inspection and testing and give sufficient notice to the Designer to permit the witnessing of the inspections or tests.

B. The Contractor shall engage a qualified, independent testing agency to perform quality control testing and inspections.

C. The Designer may require the Contractor to perform additional tests to determine compliance with these specifications.

D. Source of Supply: No earthwork materials will be accepted on the jobsite without written approval from the Engineer. The Contractor shall perform sufficient tests and inspections necessary to determine the acceptability of the source of supply. A Certified Testing and Inspection Agency shall be used to perform such test and inspections. The qualifications of the person or agency performing these tests and inspections shall be forwarded to the Designer for approval. Subsequent to this approval, test results showing the acceptability of the source of supply, shall be forwarded to the Designer for approval.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil containing oil or hazardous materials at concentrations (per 1.5.G of this Specification) exceeding the MCP Reportable Concentrations applicable to the location of

the work. Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting the requirements of ASTM D 2940 for sub-bases.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting the requirements of ASTM D 2940 for bases.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting the requirements of ASTM D 2940 for sub-bases; except material specified as Free-Draining Engineered Fill shall not contain more than 5 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially well graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting the requirements of ASTM D 2940 for bases or sub-bases; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; meeting the requirements of ASTM D 448 for coarse-aggregate grading Size 57.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; meeting the requirements of ASTM D 448 for coarse-aggregate grading Size 67.

J. Sand: Natural or manufactured sand; meeting the requirements of ASTM C for fine aggregate.

K. Surface Fill Near Buildings: MassDOT M1.08.0 - Impervious Soil Borrow.

L. Ordinary Fill: Satisfactory soil with 20 to 100 percent passing a No. 4 sieve, 5 to 50 percent passing a No. 50 sieve, and 0 to 20 percent passing a No. 400 sieve.

M. Controlled Density Fill (CDF): Controlled density fill shall consist of a cementitious hard excavatable mixture of aggregate, Portland Cement, air entraining admixtures and water. The material shall be of the type specified in Massachusetts Highway Department 1995 Standard Specifications for Highway and Bridges, Type 2E. Controlled density fill shall be used as trench backfill material around structures (not including manholes and catch basins) between the top of the crushed stone layer and the top of the structure. Controlled density fill shall also be used to fill abandoned utilities and around the excavation support systems as directed by the Designer.

N. Gravel Borrow:M1.03.0 of the MassDOT Standard Specifications

O. Crushed Stone: M2.01.0 of the MassDOT Standard Specifications

P. Dense Graded Crushed Stone: M2.01.7 of the MassDOT Standard Specifications

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 311000 - SITE CLEARING.

C. Protect and maintain erosion and sedimentation controls, which are specified in Section 311000 - SITE CLEARING and Section 312500 - EROSION AND SEDIMENTATION CONTROLS, during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

E. Coordinate with the PVTA LSP to perform testing and confirm locations of environmentally managed soils and or hazardous waste. Provide necessary equipment to support management and disposal of site generated soils associated with areas of intended earthwork operations.

3.2 DEWATERING

A. Comply with requirements of Section 312319 – DEWATERING.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Dispose of contaminated water in accordance with regulations of authorities having jurisdiction including but not limited to those outlined by the PVTA LSP and the MCP.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades 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.
    e. 6 inches beneath bottom of concrete slabs on grade.
    f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

B. Contractor shall remove obstructions encountered within 2 feet of subgrades for structures, walks, pavements, or utilities.

C. Follow a construction procedure that permits visual identification of firm stable ground. In the event that groundwater is encountered, the Designer may require that the size of the open excavation be limited to that which can be handled by the Contractor's chosen method of dewatering and allow visual observation of the bottom and backfill placement in the dry.

D. Follow procedures that confirm whether environmentally managed material and or hazardous waste is present in excavated materials. If found, follow a procedure to properly treat, store, transport and dispose of materials as outlined in the MCP and provided by an LSP.

E. Exercise extreme caution while excavating so as not to damage or disturb other appurtenances, utilities, structures and buildings not designated for removal. To avoid adverse impacts on existing buildings on footings, excavation should not intrude the “zone of influence” beneath existing building footings. The Zone of Influence is defined as the section below the footing extending outward and downward at a slope of one horizontal to one vertical (1H:1V) from 1 foot beyond the outside edges of the existing footings. Any damage caused by the Contractor’s operations shall be immediately repaired with materials and methods approved by the Engineer at no cost to the PVTA.

F. If unsuitable bearing materials are encountered at required subgrade elevations consult the Designer for direction. The extent of over-excavation of unsuitable bearing materials and the type of material used to backfill over-excavations will be determined by the Designer.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. If material at bottom of excavation is disturbed, recompaction shall be required.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide 12 inches on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Temporary Sheeting and Shoring of Trenches:

1. Comply with requirements of Section 315000 – EXCAVATION SUPPORT AND PROTECTION.

2. When conduit and foundations are being installed in a trench or hole, the Contractor shall furnish, place, and maintain such sheeting and shoring as may be required to support the sides of such excavations and adjacent structures.

3. Should the Contractor be permitted to slope the sides of such excavations so that sheeting, shoring, or bracing is not necessary to prevent cave-ins or slides along the excavation, such additional excavation and backfill required because of flattening of slopes shall be done at no additional cost to the PVTA.

3.8 SUBGRADE INSPECTION

A. Notify Designer when excavations have reached required subgrade.

B. If Designer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. In areas where it is infeasible to have large construction equipment, proof rolling shall be performed using lighter compaction equipment such as a walk-behind trench roller as well as evaluation of the subgrade with a hand probe.
4. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as directed.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Designer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi may be used when approved by Designer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Designer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
2. Stockpile soil materials in a location, acceptable to the PVTA Project Manager that will preclude having to relocate stockpiled soil materials that would otherwise delay or impact the Work.

B. If environmentally managed soil and or hazardous waste is identified in excavated soil materials, ensure the proper storage as outlined in the MCP. Confirm with the PVTA LSP whether soil materials should be treated onsite or transported to an approved facility offsite.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings with Engineered Fill; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 - CAST-IN-PLACE CONCRETE.

C. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, the Contractor, as required by the Designer, shall make special leakage tests of the structures. After the satisfactory completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using Controlled Density Fill (CDF) material. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

B. Crushed stone shall be wrapped in filter fabric, placed in maximum 6-inch thick layers, loose measure, and compacted with a minimum of four passes of a vibratory plate or roller compactor. The crushed stone shall be uniformly blended.

C. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, compact each layer of backfill or fill soil material at 95 percent; and areas within 10 feet of structures, building slabs, steps, and pavements at 92 percent.
2. Under walkways, compact each layer of backfill or fill soil material at 92 percent.
3. Under lawn or unpaved areas, compact each layer of backfill or fill soil material percent to a firm and unyielding condition.
4. For utility trenches, compact each layer of initial and final backfill soil material at 92 percent.
5. For embankments, compact each layer at minimum 92 percent minimum.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 2 Section "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to a firm an unyielding condition.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to a firm an unyielding condition.
2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase and base course to required crown elevations and cross-slope grades.
4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
5. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
6. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.20 FIELD QUALITY CONTROL

A. Independent Testing Agency: Cooperate with the Independent Testing Agency engaged by PVTA for field quality control activities for the Work of this Section. Refer also to Section 014325 - TESTING AGENCY SERVICES.

B. Cooperate with field quality control personnel.

C. Cooperate with the PVTA LSP and other agency personnel performing activities as part of the BWSC monitoring and remedial efforts.

D. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at Contractor's expense.

E. Allow testing agency to inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

F. Footing Subgrade: Footing subgrades shall be proof compacted as described above.

G. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 6938, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.

H. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Designer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the User Agency's property in accordance with all applicable local, state and federal regulations.

END OF SECTION 312300

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Construction dewatering.
   a. The project site is a MA DEP Bureau of Waste Site Cleanup ID 1-1063. Groundwater Classifications GW-2 and GW-3 apply.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 312000 - EARTH MOVING for excavating, backfilling, site grading, and for site utilities.
2. Section 315000 - EXCAVATION SUPPORT AND PROTECTION for shoring, bracing, and sheet piling of excavations.
3. Section 3125000 – EROSION AND SEDIMENTATION CONTROLS for temporary erosion and sedimentation controls.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain temporary dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified Professional Engineer registered in the Commonwealth of

Massachusetts, using performance requirements and design criteria indicated. All costs for delegated design shall be included in the bid price for the Work of this Section.

2. Test groundwater for oil or hazardous materials at start of construction operations. Provide on-site treatment system to treat all water removed from excavations in a manner that does not result in negative on- or off-site impacts and in compliance with applicable regulations including but not limited to those outlined in the Massachusetts Department of Environmental Protection 310 CMR 40.00 Massachusetts Contingency Plan (MCP).
3. Water removed from excavations shall be, directly or indirectly discharged to a surface water in accordance with a National Pollutant Discharge Elimination System (NPDES) permit issued by the U.S. Environmental Protection Agency (EPA). If neither reinfiltration nor surface water discharge is feasible, treated water shall be discharged to the Massachusetts Water Resources Authority (MWRA) or local sewer system in accordance with the appropriate permit and regulations. In no case shall dewatering flows be directly or indirectly released to surface waters or storm drains prior to settling and appropriate additional treatment.
4. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
5. Prevent surface water from entering excavations by grading, dikes, or other means.
6. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
7. Remove dewatering system when no longer required for construction.

1.4 SUBMITTALS

A. Shop Drawings for dewatering system: Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written Plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the Commonwealth of Massachusetts responsible for their preparation.

C. Delegated-Design Submittal: For dewatering system that the performance requirements, design criteria, and monitoring analysis data are in accordance with the MCP, and other treatment and discharge requirements, by a Licensed Site Professional in the Commonwealth of Massachusetts.

D. Qualification Data: For qualified Installer

E. Field quality-control reports.

F. Other Informational Submittals:

1. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.5 QUALITY ASSURANCE

A. Employ the services of a Dewatering Professional and a Massachusetts Registered Professional Engineer having the following qualifications:
1. The Massachusetts Registered Professional Civil Engineer shall have completed the design of at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years consisting of deep wells, well points, vacuum well points, and sump pumping for projects of similar size, type, and complexity with the temporary support of excavation systems proposed by the Contractor including, but not limited to, trench boxes, soldier pile and lagging, timber sheeting support and secant pile support of excavation systems.
2. The dewatering systems installer supervisor shall have a minimum of 5 years' experience in installation of well points, deep wells, recharge systems, or equal systems.
3. The Dewatering Professional responsible for day to day operation of the system shall have the following minimum qualifications:

a. Completion of at least 5 successful dewatering projects of equal size and complexity with equal systems within the last five (5) years consisting of system operation and troubleshooting, collection of readings, maintenance of logs and other required documents, collection of samples, coordination of analysis of samples, and compliance with reporting requirements during pumping for heavy Civil projects of similar size, type, and complexity in urban areas.

b. Valid certification from the Massachusetts Department of Environmental Protection (DEP) to operate the proposed treatment system..

B. Regulatory Requirements: Comply with governing Massachusetts Department of Environmental Protection (MassDEP) and U.S. Environmental Protection Agency and other applicable regulations and permitting and notification requirements before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Review methods and procedures related to dewatering including, but not limited to, the following:

a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
b. Geotechnical report.
c. Proposed site clearing and excavations.
d. Existing utilities and subsurface conditions.

e. Coordination for interruption, shutoff, capping, and continuation of utility services.
f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
g. Testing and monitoring of dewatering system.
h. Control of dewatering equipment during non-work hours.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by PVTA or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify PVTA Project Manager no fewer than seven days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without PVTA Project Manager's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. PVTA will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
2. The geotechnical report is referenced elsewhere in the Project Manual.

C. MassDEP Bureau of Waste Site Cleanup (BWSC) Monitoring: This project site is listed as a hazardous materials site under the MassDEP BWSC with Release tracking # (ID-1-1063). Soil on site has been classified as S-3/GW-2 and S-3/GW-3. Impacted groundwater has been classified as GW-2 and GW-3. Remedial actions and monitoring are ongoing and expected to take place during Project construction activities.
1. The Contractor is responsible for ensuring all work is done in compliance with the requirements outlined in the MCP.
2. The Contractor is responsible for coordinating Project work with the PVTA Licensed Site Professional (LSP).

D. Survey Work: Engage a qualified land surveyor or professional engineer licensed in the Commonwealth of Massachusetts to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Designer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide groundwater monitoring wells in accordance with the submitted dewatering plan or as specified.

B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.

C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.

D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.

E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.

F. Provide dewatering equipment, including an appropriately sized settling tank, and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.

G. Provide cement grout having a water cement ratio of 1 to 1 by volume.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install and operate dewatering system to control groundwater levels as required for the proposed constructions.

C. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the PVTA Project Manager and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

D. Provide temporary grading to facilitate dewatering and control of surface water.

E. Monitor dewatering systems continuously.

F. Promptly repair damages to adjacent facilities caused by dewatering.

G. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 312500 - EROSION AND SEDIMENTATION CONTROLS during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches below excavation subgrade.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment mixed with hazardous waste in a manner that abides by requirements outlined in the MCP. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to PVTA.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

C. If dewatering operations result in the infiltration of contaminated water removed by dewatering, the Contractor is responsible for immediately notifying the PVTA LSP and filling out the proper permits and documentation at no additional expense to PVTA.

3.4 REMOVAL

A. Do not remove dewatering system without written approval from the Engineer.

B. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

END OF SECTION 312319

SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Control measures to prevent all erosion, siltation and sedimentation of wetlands, waterways, construction areas, adjacent areas and off-site areas.
2. Control measures shall be accomplished adjacent to or in the following work areas:
   a. Soil stockpiles and on-site storage and staging areas.
   b. Cut and fill slopes and other stripped and graded areas.
   c. Constructed and existing swales and ditches.
   d. Surface water bodies, including retention and detention ponds.
   e. At edge of wetlands areas, if applicable, as shown on Drawings.
3. Additional means of protection shall be provided by the Contractor as required for continued or unforeseen erosion problems, at no additional cost to PVTA.
4. Periodic maintenance of all sediment control structures shall be provided to ensure intended purpose is accomplished. Sediment control measures shall be in working condition at the end of each day.
5. After any significant rainfall, sediment control structures shall be inspected for integrity. Any damaged device shall be corrected immediately.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 311000 – SITE CLEARING for protection of existing tress and other vegetation to remain.
2. Section 312000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.

1.3 QUALITY ASSURANCE

A. When applicable, comply with the requirements of Stormwater Pollution Prevention Plan prepared for the NPDES permit, which are incorporated herein by reference, and all other applicable requirements of governing authorities having jurisdiction. The specifications and drawings are not represented as being comprehensive, but rather convey the intent to provide complete slope protection and erosion control for both the project site and adjacent property.

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a sediment and erosion control plan specific to the site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

B. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.

C. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time, and the length of time of exposure.

D. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.

E. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving stream bed, provide measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the stream.

F. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.

G. The Contractor is responsible for cleaning out and disposing of all sediment once the storage capacity of the sediment facility is reduced by one-half.

H. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

I. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Straw Bales: Wire or nylon bound bales of straw, oriented around sides, rather than over and under.

B. Stakes: Stakes for bales shall be one of the following materials: Wood stakes of sound hardwood 2 by 2 inches in size or steel reinforcing bars of at least No. 4 size. Lengths shall be approximately three feet.

C. Siltation Fence: Fabricated or prefabricated unit consisting of the following filter fabric properties:

1.	Grab Tensile Strength	90	ASTM D1682
2.	Elongation at Failure (%)	50	ASTM D1682
3.	Mullen Burst Strength (PSI)	190	ASTM D3786
4.	Puncture Strength (lbs)	70	ASTM D751 (modified)
5.	Slurry Flow Rate (gal/min/sf)	0.5	Virginia DOT VTM-51
6.	Equivalent Opening Size	40-80	US Std Sieve CW-02215
7.	Ultraviolet Radiation Stability (%)	90	ASTM G26

D. Fencing: Steel posts shall be standard 6 foot long metal stamped drive stakes commonly used to support snow fences. Fencing shall be new four foot height wood lath snow fencing. Provide suitable steel staples or heavy nylon cord for securing filter cloth to support system.

E. Protective Measures: As temporary coverings on ground areas subject to erosion, provide one of the following protective measures, and as directed by the Designer with concurrence of the PVTA Project Manager:

1. Hay or straw temporary mulch, 100 pounds per 1,000 square feet.
2. Wood fiber cellulose temporary mulch, 35 pounds per 1,000 square feet.
3. Tackafier for anchoring mulch or straw shall be a non-petroleum based liquid bonding agent specifically made for anchoring hay or straw.
4. Provide natural (jute, wood excelsior) or man-made (glass fiber) covering with suitable staples or anchors to secure to ground surface. Note that wire stapes and non-biodegradable coverings shall not be used for any area that will be mown turf.
5. Temporary vegetative cover for graded areas shall be undamaged, air dry threshed straw or hay free of undesirable weed seed.

F. Silt Sack: Silt Sack shall be made of woven polypropylene geotextile materials suitable for installation in catch basins and shall be “Streamguard” as manufactured by Stormwater Services Corporation, “Siltsack” as manufactured by Geo-Synthetics, LLC, “Siltsack” as manufactured by Atlantic Construction Fabrics, Inc., or approved equal. The sack shall overlap the frame at a minimum of 6 in. For areas where there is a concern for oil run-off or spills an oil-absorbent pillow insert can be used or the geotextile can be made completely from an oil-absorbent geotextile, with a woven pillow insert.

G. Compost Filter Tube: Compost filter tube shall be staked into the ground:
   1. Compost filter tube shall consist of jute mesh or approved biodegradable material. Compost filter tube shall be a minimum 12 in. in diameter with an effective height of 9.5 in.
   2. Stakes for compost filter tube shall be standard 2 in. by 2 in. wood stakes or approved equal.

PART 3 - EXECUTION

3.1 STRAW BALE BARRIERS

A. Excavation shall be to the width of the bale and the length of the proposed barrier to a minimum depth of 4 inches.

B. Bales shall be placed in a single row, lengthwise on proposed line, with ends of adjacent bales tightly abutting one another. In swales and ditches the barrier shall extend to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale.

C. Staking shall be accomplished to securely anchor bales by driving at least two stakes or rebars through each bale to a minimum depth of 18 inches.

D. The gaps between bales shall be filled by wedging straw in the gaps to prevent water from escaping between the bales.

E. The excavated soil shall be backfilled against the barrier. Backfill shall conform to ground level on the downhill side and shall be built up to 4 inches on the uphill side. Loose straw shall then be scattered over the area immediately uphill from a straw barrier.

F. Inspection shall be frequent and repair or replacement shall be made promptly as needed.

3.2 STABILIZED CONSTRUCTION ENTRANCE AND STONE BERMS

A. Stone size: Use ASTM designation C-33, size No. 2 (1-1/2” to 2-1/2”). Use crushed stone.

B. Length: As effective, but not less than 50 feet.

C. Thickness: Not less than eight inches.

D. Width: Not less than full width of all points on ingress or egress, but not less than 25 feet.

E. Washing: When necessary, wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it shall be done on an area stabilized with crushed stone which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through the use of sand bags, gravel boards or other approved methods.

F. Maintenance: The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-or-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spoiled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

G. Place crushed stone berms in locations required and as directed. Berms shall have side slopes of 1:3 or less.

H. Inspect stone berms periodically and replace and/or regrade crushed stone as required.

3.3 SILT FENCING

A. Excavate a 6 inch trench along the upstream side of the desired fence location.

B. Drive fence posts a minimum of 1’-6” into the ground. Install fence, well-staked at maximum eight foot intervals in locations as shown on Drawings. Secure fabric to fence and bury fabric end within the six inch deep trench cut.

C. Lay lower 12 inches of silt fence into the trench, 6 inches deep and 6 inches wide. Backfill trench and compact. Overlap joints in fabric at post to prevent leakage of silt at seam.

3.4 EROSION CONTROL GRASSING

A. Grassing shall be applied according to State of Massachusetts Highway Department Standard Specifications.

3.5 COMPOST FILTER TUBE

A. Staked compost filter tube siltation barriers shall be installed at the following locations:
   1. Toe of embankment construction.
   2. Toe of abutments/retaining walls and temporary earthwork stockpiles.
   3. Across construction ditches prior to entry into any drainage system or waterway.
   4. Other locations shown on the Contract Drawings, as dictated by the Order of Conditions or as designated by the Engineer.
   5. Toes of temporary earthwork stockpile.

B. Abut compost filter tubes to form a continuous barrier. Compost filter tubes shall be tamped in place to ensure good contact with soil surface. It is not necessary to trench tubes into existing grade. Compost filter tubes shall be securely anchored by stakes placed up to 5 ft apart or as

required to secure tubes in place. When staking is not possible, such as when tubes must be placed on pavement, heavy concrete or cinder blocks can be used behind tubes up to 5 ft apart or as required to secure tubes in place. Do not puncture tubes with stakes. Provide a 3 ft minimum overlap at ends of tubes to join in a continuous barrier and minimize unimpeded flow. Stake joining tubes snugly against each other to prevent unfiltered flow between them. Secure ends of tubes with stakes spaced 18 in. apart.

3.6 INLET PROTECTION

A. Install silt sacks at inlets within and receiving runoff from the site. Follow manufacturer's written instructions for installation and maintenance of silt sacks.

3.7 DUST CONTROL

A. Throughout the construction period the Contractor shall carry on an active program for the control of fugitive dust within all site construction zones, or areas disturbed as a result of construction. Control methods shall include the following: Apply calcium chloride at a uniform rate of one and one-half (1 ½) pounds per square yard in areas subject to blowing. For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

B. The frequency and methods of application for fugitive dust control shall be as directed by the Designer with concurrence by the PVTA Project Manager.

3.8 TEMPORARY PROTECTIVE COVERINGS (AFTER GROWING SEASON)

A. Place temporary covering for erosion and sedimentation control on all areas that have been graded and left exposed after October 30. Contractor shall have the choice to use either or both of the methods described herein.

B. Hay or straw shall be anchored in-place by one of the following methods and as approved by the Designer with concurrence by the PVTA Project Manager: Mechanical "crimping" with a tractor drawn device specifically devised to cut mulch into top two inches of soil surface or application of non-petroleum based liquid tackifier, applied at a rate and in accordance with manufacturer's instructions for specific mulch material utilized.

C. Placement of mesh or blanket matting and anchoring in place shall be in accordance with manufacturer's printed instructions.

D. Inspect protective coverings periodically and reset or replace materials as required.

END OF SECTION 312500

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Temporary excavation support and protection systems.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 013200 - CONSTRUCTION PROGRESS DOCUMENTATION for recording preexisting conditions and excavation support and protection system progress.
2. Section 015000 - TEMPORARY FACILITIES AND CONTROLS for temporary utilities and support facilities.
3. Section 312000 - EARTH MOVING.
4. Section 312319 - DEWATERING for dewatering system for excavations.

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure, superimposed construction loads, and loads from adjacent structures, roadways, and railways

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer registered in the Commonwealth of Massachusetts.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

4. Provide vibration monitoring to prevent impacts on adjacent structures and utilities.

B. Consult official records of existing utilities, both surface and subsurface, and their connections to be fully informed on all 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. Expose them by hand excavation or by other methods acceptable to the utility owner. Protect existing utilities to remain within and adjacent to the work area in accordance with the requirements of authorities having jurisdiction over the same. The Contractor is responsible for any damage to utilities caused by the Contractor's operations and shall restore them to equal or better operation at no additional cost to the owner.

1.4 SUBMITTALS

A. Contractor submittals shall be acceptable to the Designer prior to undertaking the work. The Contractor shall forward submittals a minimum of 1 month in advance considering that resubmittals may be required.

B. Shop Drawings and Calculations: Prepared by or under the supervision of a qualified Structural Engineer registered in the Commonwealth of Massachusetts for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by the qualified professional engineer licensed in the Commonwealth of Massachusetts responsible for their preparation.
2. Identify elements of the support that will not be left in place, as well as elements that will serve in a permanent capacity.
3. Provide all engineering calculations and design assumptions, considering all intermediate construction stages as well as final conditions. Include estimates of deflections under applied loads, material types, and capacities. The design shall consider the potential need for over-excavation to remove unsuitable materials below the planned bottom of excavation.

C. Provide a Work Plan demonstrating the means, methods, and sequencing of the work including but not limited to the following:

1. Provide overall plan layout of the system indicating wall types, and clearance from existing and proposed utilities, structure, and other obstructions. Indicate dimensions, material properties, locations, spacing and penetration depths of all member, and the locations and various types of lateral support elements.
2. Show the overall sequence of excavation and installation of bracing, if required.

D. Qualification Data: For installer and professional engineer.

E. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:

a. Geotechnical report.
b. Existing utilities and subsurface conditions.
c. Proposed excavations.
d. Proposed equipment.
e. Monitoring of excavation support and protection system.
f. Working area location and stability.
g. Coordination with waterproofing.
h. Abandonment or removal of excavation support and protection system.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving occupied facilities unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify PVTA Project Manager no fewer than ~~two~~ seven days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without PVTA Project Manager's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. PVTA will not be responsible for interpretations or conclusions drawn from the data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
2. The geotechnical report is referenced elsewhere in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer licensed in the Commonwealth of Massachusetts to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Designer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

E. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

F. Timber Piling: ASTM D 25, species listed in AWPA C3, pressure-treated in accordance with AWPA C3.

G. Seven Wire Strand: ASTM A 416, Grade 250 or 270., uncoated seven-wire, low-relaxation strand.

H. Grout: Suitable for service, minimum 4,000 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the PVTA Project Manager and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Vibratory methods shall not be used to install elements of the excavation support system within 20 feet of existing structures.

F. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

1. Damage to adjacent structures or facilities shall be repaired by the Contractor at his own cost and at no cost to PVTA.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier beams before starting excavation. Space soldier beams at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wales horizontally at spacings indicated on the approved shop drawings and secure to soldier beams.

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately 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. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Use of tiebacks is subject to approval of the PVTA

B. Tiebacks: Drill for, install, grout, and tension tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Test loading shall be observed by a qualified professional engineer licensed in the Commonwealth of Massachusetts responsible for design of excavation support and protection system.
2. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.
3. Inspect tiebacks periodically to confirm anchors exhibit no movement.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Designer.
2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.
2. Fill voids immediately with approved backfill compacted to density specified in Section 312000 - EARTH MOVING.
3. Repair or replace, as approved by Designer, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION 315000

SECTION 321723 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: This Section specifies the furnishing and application of reflectorized pavement markings.

B. All work shall be in accordance with the Commonwealth of Massachusetts, Department of Transportation (MassDOT) Standard Specification for Highways and Bridges.

C. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 033000 – CAST-IN-PLACE CONCRETE for formwork, reinforcement, concrete materials, mixture design, placement procedures and finishes.

1.3 SUBMITTALS

A. Submit a schedule of pavement marking operations to the Engineer, for approval, not less than seven days prior to the proposed date of application of any pavement marking.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acrylic Striping: Comply with MassDOT requirements. Pavement striping material shall be an acrylic type, low VOC, water based paint. Pavement markings shall be listed on MassDOT's Qualified Construction Materials List (QCML) for Water Borne Traffic Paint.

1. White Color: Composition by weight:

Pigment:	58 percent minimum.
Total Solids:	76 percent minimum.
Titanium Dioxide:	1 pound/gallon minimum.

2. Yellow Color: Composition by weight:
   Pigment: 56 percent minimum.
   Total Solids: 75 percent minimum.
   Titanium Dioxide: 0.3 pounds/gallon minimum.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING MARKINGS

A. Remove existing pavement markings that conflict with proposed pavement markings by using a blasting method approved by the Engineer. Mechanical grinding or other methods that scar existing pavement will not be allowed.

3.2 PREPARATION

A. The contractor shall pre-mark locations of pavement markings for approval by the Engineer before installing final markings. Reapply any line deviating from the establishing control or of incorrect width.

3.3 APPLICATION OF MARKINGS

A. Apply pavement markings as follows:

MATERIAL	MATERIAL APPLICATION TEMPERATURE DEGREES F	LINE THICKNESS MILS	REFLECTORIZED BEAD APPLICATION
M7.01.04	40-120	15	6 LBS/GAL

B. Use no thinners for the above-listed pavement marking applications except in accordance with the manufacturer's specifications and at the direction of the Engineer.

C. Heat no paint or pavement marking material above the temperature marked on the container.

D. Apply markings only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free of sand, grease, oil or other foreign substances prior to the application. Prepare the surface to accept the application as part of the work of this section, with no additional compensation. The Engineer will make the final determination for all of the foregoing.

E. Bituminous concrete pavements shall have been in place for 48 hours prior to the application of pavement markings. When it is necessary to expedite the flow of traffic, the Engineer may reduce the waiting period as is deemed necessary.

F. The ambient (air) temperature for thermoplastic application is to be a minimum of 45 Degrees F and rising at the time of marking operations. If work has started and air temperatures fall below 45 Degrees F and continuous cooling is indicated, work shall be stopped. In cool weather conditions, temporary drops down to 40 Degrees F will be tolerated providing temperatures also vary upwards. Sustained striping (greater than one hour) at 40 Degrees F shall not be allowed. Starting work at air temperatures lower than 45 Degrees F shall not be allowed. Contractor shall remove and replace thermoplastic applications below 40 Degrees F at no expense to the Authority.

G. If for any reason material is spilled or tracked on the highway, or any markings applied by the Contractor, in the Engineer's judgment, are of incorrect width or pattern or fail to conform to the established line of reference, remove such material by a method that is not injurious to the roadway surface and is acceptable to the Engineer, clean the roadway surface, prepare the surface for a reapplication of markings, and reapply the markings as directed without additional compensation for any of the foregoing corrective operations.

3.4 PROTECTION OF MARKINGS

A. Protect markings until sufficiently dry to bear traffic on highways that are open to traffic. Protect markings by traffic cones not less than 18 inches in height except in the case of markings which cure to a no-track condition in 180 seconds or less. In the latter case, protection may be provided by a convoy of vehicles with suitable warning devices to warn overtaking or on-coming traffic that the pavement marking operation is in progress.

B. Broken Lines. On tangents and on curves of 1000 foot radius or greater place at least one cone on every other bar. On curves of less than 1000 foot radius place one cone on every bar unless otherwise directed by the Engineer.

C. Solid Lines. On tangents and on curves of 1000 foot radius or greater space cones not over 50 feet apart and on curves of less than 1000 foot radius space cones not over 50 feet unless otherwise directed by the Engineer. On edge lines adjacent to the median, wider spacing may be used as directed by the Engineer. In order to control the proper positioning of the cones during the drying period, assign sufficient personnel as determined by the Engineer. Such control is dependent on traffic density, cone widths, and the like.

END OF SECTION 321723