

**PROJECT
SPECIFICATIONS**

FOR

***Filippello Park
Spray Pad Renovation***

City of Watertown, Massachusetts

February 2023



CDM SMITH, INC.

**Water, Environment, Transportation, Energy, Facilities
Boston, Massachusetts**

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CITY OF WATERTOWN, MASSACHUSETTS
FILIPPELLO PARK SPRAY PAD RENOVATION

INVITATION TO BID

Sealed Bids for construction of Filippello Park Spray Pad Renovation will be received by the Purchasing Agent of the City of Watertown at the City Hall, 149 Main Street, Watertown, MA 02742, until, 11:00 AM, on Wednesday March 1, 2023 and at that time and place bids will be publicly opened and read aloud.

The work includes demolition, clearing, removals and disposal of existing spray pad and equipment, drains, water service lines, electrical service, spray pad water service controls and manifold in the adjacent restroom building, installation of a new spray pad, surfacing, equipment, seat blocks, water service lines, electrical service, water service controls and manifold, water pressure reducers, stormwater/sewer diverter structure, sewer backflow preventor.

Filippello Park is constructed over a former landfill. All work shall be in accordance with conditions approved by the Massachusetts Department of Environmental Protection. All soil shall remain on site and the work includes relocating excavated soil to a soil excavate berm adjacent to the spray pad and covering with clean fill, topsoil and sodded.

Contract Documents will be available electronically beginning 1:00 PM on February 9, 2023 by contacting the Purchasing Agents Office at 617-972-6414 or email at purchasing@watertown-ma.gov. Contract Documents may be examined at the City of Watertown, MA. City Hall, 149 Main Street, Watertown, MA 02742, until prevailing time on Wednesday, March 1, 2023 at 11:00 a.m. in the Lower Hearing Room at City Hall.

Copies of Addenda issued will be mailed or delivered to registered bidders without charge. It is the responsibility of each bidder to ensure addenda issued were received by calling the Purchasing Department prior to bidding at 617-972-6414 or email at purchasing@watertown-ma.gov.

Each Bidder shall fully acquaint themselves with the conditions as they exist and shall thoroughly examine the Bid Documents. Failure of any Bidder to acquaint themselves with the Bid Documents shall in no way relieve Bidder from any obligation with respect to their Bid.

A non mandatory pre-bid meeting will be held at Filippello Park, 166 Grove Street, Watertown Massachusetts, Thursday February 16, 2023 at 2:00 PM. The meeting will start at the spray park near the restroom building.

Each bid must be accompanied by a certified check, issued by a responsible bank or trust company, or a bid bond duly executed by the bidder as principal and having as surety thereon a surety company approved by the City, all in the amount of 5% of the bid payable to the "City of Watertown".

Bids must be sealed and clearly marked "Filippello Park Spray Pad Renovation" and submitted to the Purchasing Agents Office no later than 11:00 a.m., prevailing time Wednesday, March 1, 2023.

Bidders may not withdraw their Bids for a period of 45 days, excluding Saturdays, Sundays, and legal holidays after the actual date of the opening of the Bids.

The Successful Bidder must furnish a 100 percent Performance Bond and a 100 percent Payment Bond with a surety company acceptable to the Owner.

Complete instructions for filing Bids are included in the Instructions to Bidders.

Wage rates for this Project are subject to the minimum wage rates as per M.G.L., Chapter 149, Section 26 to 27H inclusive.

The bidding and award of this Contract will be under the provisions of M.G.L. Chapter 30, Section 39M.

All contracted services with the City of Watertown are dependent on appropriation of funds.

The City of Watertown reserves the right to accept any bid, to reject any/or all bids and to waive minor irregularities and/or formalities as it deems to be in the best interest of the City.

The City of Watertown is an Equal Opportunity Employer.

Brian Wyncoop
Purchasing Agent
CITY OF WATERTOWN

CITY OF WATERTOWN, MASSACHUSETTS
FILIPPELLO PARK SPRAY PAD RENOVATION

INSTRUCTIONS TO BIDDERS

This Project is subject to approval and funding. Bids must remain valid for 45 days.

ARTICLE 1. QUALIFICATIONS OF BIDDERS

1.1 Bidders may be investigated by OWNER to determine if they are qualified to perform the Work. All Bidders shall be prepared to submit within five days of OWNER's or ENGINEER's request, written evidence of such information and data necessary to make this determination.

1.2 The investigation of a Bidder will seek to determine whether the Bidder has adequate experience. Investigations may include whether the bidder is adequate in size, is authorized to do business in the jurisdiction where the project is located, has had previous experience and whether available equipment and financial resources are adequate to assure OWNER that the Work will be completed in accordance with the terms of the Agreement. The amount of other work to which the Bidder is committed will also be considered.

1.3 In evaluating Bids, OWNER will consider the qualifications of only those Bidders whose Bids are in compliance with the prescribed requirements.

1.4 OWNER reserves the right to reject any Bid if the evidence submitted by, or the investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the Work contemplated therein.

ARTICLE 2. COPIES OF CONTRACT DOCUMENTS

2.1 Complete sets of Contract Documents shall be used in preparing Bids; neither OWNER nor ENGINEER assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

2.2 OWNER and ENGINEER in making copies of Contract Documents available do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

ARTICLE 3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

3.1 Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may in any manner affect cost, progress or performance of the Work, (c) become familiar with Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the requirements of the Contract Documents.

3.2 Surveys at the site which have been relied upon by ENGINEER in preparing the Contract Documents are identified in Article 5 of the Supplementary Conditions. These reports are not guaranteed or warranted as to accuracy or completeness, nor are they part of the Contract Documents.

3.3 Before submitting a Bid, Bidders may, at their own expense, make investigations as they may deem necessary to determine their Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

3.4 Bidder may visit the site at Filippello Park, 166 Grove St., Watertown, Massachusetts to conduct such investigations as each Bidder deems necessary for the submission of a Bid. Bidder shall notify Purchasing Office, City of Watertown, 617-972-6414 prior to conducting a site visit.

3.5 The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Supplementary Conditions, General Requirements or on the Drawings.

3.6 The submission of a Bid will constitute an incontrovertible representation that the Bidder has complied with every requirement of this Article 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

ARTICLE 4. INTERPRETATIONS

4.1 All questions about the meaning or intent of the Contract Documents shall be received in writing by emailing Scott Landgren at LandgrenSW@cdmsmith.com at least five days before the date set herein for the opening of bids.

4.2 Written clarifications or interpretations will be issued by Addenda not later than two days before the bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other clarifications or interpretations will be without legal effect. Addenda will be emailed to all parties recorded as having received the Contract Documents.

4.3 Bidders are responsible for determining that they have received all Addenda issued.

ARTICLE 5. PRE-BID CONFERENCE

5.1 A pre-bid conference will be held on February 16, 2023, at 2:00 PM at Filippello Park.

ARTICLE 6. BID SECURITY

6.1 Each Bid must be accompanied by cash, bid bond, or a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company, payable to OWNER. The Bid Security shall be in the amount stated in the Invitation to Bid. Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid. All Bid Securities except those of the three lowest responsible and eligible Bidders will be returned within five days, Saturdays, Sundays, and legal holidays excluded, after opening of the Bids. All Bid Securities will be returned on the execution of the Agreement or if no award is made, within 45 days, excluding Saturdays, Sundays and legal holidays after the actual date of opening of the Bids, unless forfeited under the conditions herein stipulated.

6.2 In case a party to whom a Contract is awarded shall fail or neglect to execute the Agreement and furnish the satisfactory bonds within the time specified, OWNER may determine that the Bidder has abandoned the Contract, and thereupon the Bid Forms and acceptance shall be null and void and the Bid Security accompanying the Bid Form shall be forfeited to OWNER as liquidated damages for such failure or neglect and to indemnify said OWNER for any loss which may be sustained by failure of the Bidder to execute the Agreement and furnish the bonds as aforesaid, provided that the amount forfeited to OWNER shall not exceed the difference between the Bid Price of said Bidder and that of the next lowest

responsible and eligible bidder and provided further that, in case of death, disability, or other unforeseen circumstances affecting the Bidder, such Bid Security may be returned to the Bidder. After execution of the Agreement and acceptance of the bonds by OWNER, the Bid Security accompanying the Bid Form of the Successful Bidder will be returned.

ARTICLE 7. PERFORMANCE, PAYMENT AND OTHER BONDS

7.1 Performance, Payment and other Bonds shall be provided in accordance with Article 6 of the Conditions of the Contract.

7.2 All Bonds required as Contract Security shall be furnished with the executed Agreement.

ARTICLE 8. BID FORM

8.1 Each Bid shall be submitted on the Bid Form on the perforated pages appended to the Project Manual. The Bid Form shall be removed and submitted separately. All blank spaces for Bid prices must be filled in with the unit price for the item or the lump sum for which the Bid is made.

8.2 Bid Forms shall be completed in ink or by typewriter. The Bid price of each item on the form shall be stated in words, and figures. If unit prices are required on the Bid Form, discrepancies between unit prices and their respective total amounts will be resolved in favor of the unit prices. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

8.3 Bids by corporations shall be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

8.4 Bids by Limited Liability Companies shall be executed in the Limited Liability name by the Manager (or other Limited Liability Company officer/representative accompanied by evidence of authority to sign.) The Limited Liability Company address and state where the Limited Liability Company was formed shall be shown below the signature.

8.5 Bids by partnerships shall be executed in the partnership name and signed by a partner, whose title shall appear under the signature. The official address of the partnership shall be shown below the signature.

8.6 All names shall be typed or printed below the signature.

8.7 The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

8.8 The address to which communications regarding the Bid are to be directed shall be shown.

8.9 One copy of each Bid shall be submitted in a sealed opaque envelope bearing on the outside the Bidder's name, address, and the Project Title for which the Bid is submitted. (If forwarded by mail, Bid and sealed envelope marked as described above shall be enclosed in another envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Invitation to Bid.) The Bid Security shall be submitted in a separate envelope from the Bid and attached to the envelope containing the Bid.

8.10 Optional “OR EQUAL”: Optional Proposal for an Equal. If the words “Or equal” or equivalent words are used in connection with the naming of one or more specifics in the contract or in the specifications, incorporated in and made a part of the contract, such words shall be disregarded in submitting any bid. That is to say, every bid shall be submitted on the basis of the specific or specifics named; and the selection of the successful bidder shall be governed by the bids submitted on such basis. No person shall submit a bid on the basis of the specific or specifics named unless he is able and willing to execute and perform a contract on the basis of the specific or specifics named.

ARTICLE 9. RECEIPT OF BIDS

9.1 Sealed Bids for the work of this Contract will be received at the time and place indicated in the Invitation to Bid.

9.2 OWNER may consider informal any Bid not prepared and submitted in accordance with the provisions hereof.

9.3 Bidders are cautioned that it is the responsibility of each individual bidder to assure that their bid is in the possession of the responsible official or the designated alternate prior to the stated time and at the place of the Bid Opening. Owner is not responsible for bids delayed by mail and/or delivery services, of any nature.

ARTICLE 10. MODIFICATION AND WITHDRAWAL OF BIDS

10.1 Bids may be modified only by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

10.2 Bids may be withdrawn prior to the scheduled time (or authorized postponement thereof) for the opening of Bids.

10.3 Any Bid received after the time and date specified shall not be considered. No Bid may be withdrawn for a period of forty five days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids.

ARTICLE 11. AWARD OF CONTRACT

11.1 The Contract will be awarded to the lowest responsible and eligible Bidder (Successful Bidder). Such a Bidder shall possess the skill, ability, and integrity necessary for the faithful performance of the work. The term "lowest responsible and eligible Bidder" as used herein shall mean the Bidder whose Bid is the lowest of those Bidders possessing the skill, ability and integrity necessary to the faithful performance of the Work.

11.2 OWNER reserves the right to reject any and all Bids, to waive any and all informalities if it is in Owner's best interest to do so, and the right to disregard all nonconforming, non-responsive or conditional Bids, including unqualified bidders as vetted through the *Bidder's Qualification Form* and investigations.

11.3 A Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.

11.4 OWNER also reserves the right to reject the Bid of any Bidder that OWNER considers to be unqualified relative to Article 1 above.

11.5 If the Contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within forty five days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids. All bids shall remain open for forty five days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids but OWNER may, at OWNER's sole discretion, release any Bid and return the Bid Security prior to that date.

ARTICLE 12.EXECUTION OF AGREEMENT

12.1 When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents. Within five days, excluding Saturdays, Sundays and legal holidays, after the date of receipt of such notification CONTRACTOR shall execute and return all copies of the Agreement and all other applicable Contract Documents to OWNER. Within ten days thereafter OWNER will deliver one fully signed copy to CONTRACTOR.

ARTICLE 13.SAFETY AND HEALTH REGULATIONS

13.1 This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, and to any applicable Massachusetts regulations. Contractors shall be familiar with the requirements of these regulations.

13.2 The Successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

13.3 The Successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act, on the Site to inspect the Work and to supervise the conformance of the Work with the regulations of the Act.

ARTICLE 14.ACCESS TO WORK

14.1 Representatives of the Commonwealth and any local agencies having a direct interest in the Work shall have access to the Work under this contract wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection.

ARTICLE 15.SALES TAX

15.1 The material and supplies to be used in the Work will be subject to the requirements of Paragraph 7.09 of the Conditions of the Contract.

ARTICLE 16.UTILITY UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

16.1 All excavations within public or private ways are subject to the requirements of Massachusetts General Law, Chapter 82, Section 40 included in Part II of the Supplementary Conditions.

ARTICLE 17.WAGE RATES

17.1 Minimum Wage Rates as determined by the Commissioner of the Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Section 26 to 27H, as amended, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if

necessary, any additional information on Minimum Wage Rates for those tradespeople who may be employed for the proposed work under this Contract.

17.2 The State schedule of minimum wage rates is included in Part II of the Supplementary Conditions.

ARTICLE 18.COMPETITIVE BIDDING

18.1 The bidding and award of the Contract shall be in full compliance with Section 39 M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

ARTICLE 19. PRICE ADJUSTMENTS

19.1 Due to the uncertainty of prices for certain materials (liquid asphalt, Portland cement, diesel fuel and gasoline, structural steel and reinforcing steel) price adjustments will be in accordance with Appendix H, which is included in Part 2 of the Supplementary Conditions. The base price for each material shall be the period price in effect at the time the project is advertised. The price adjustment clause shall provide for a contract adjustment to be made on a monthly basis when the monthly cost change exceeds plus or minus 5 per cent. Period prices can be found at the Massachusetts Department of Transportation (MassDOT) website at

<http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/Construction/PriceAdjustments.aspx>

Brian Wyncoop
Purchasing Agent
CITY OF WATERTOWN

END OF DOCUMENT 002113

BID FORM

CITY OF WATERTOWN, MASSACHUSETTS FILIPPELLO PARK SPRAY PAD RENOVATION

The undersigned declares that the only persons or parties interested in this Bid as principals are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Contract Documents as prepared by CDM Smith, 75 State Street, Suite 701, Boston, MA 02109 and dated February, 2023 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Bid Form is a part.

If a Notice of Award accompanied by at least six unsigned copies of the Agreement and all other applicable Contract Documents is delivered to the undersigned within (45) days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids, the undersigned will within five days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Agreement and all other applicable Contract Documents to Owner. The premiums for all Bonds required shall be paid by Contractor and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of Owner if the Bidder fails to execute the Agreement as stated above.

The Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid.

The undersigned hereby agrees that the Contract Time shall commence twenty days following the Effective Date of the Agreement and to fully complete the Work within 120 Calendar Days and in accordance with the terms as stated in the Agreement. The undersigned further agrees to pay OWNER, as liquidated damages, \$1,000 per day for each calendar day beyond the Contract Time Limit or extension thereof that the Work remains incomplete, in accordance with the terms of the Agreement.

The undersigned acknowledges receipt of addenda numbered:

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the Work in its entirety in the manner and under the conditions required at the prices listed as follows:

PART I - BASE BID:

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Brief Description of Items with Price in Words</u>	<u>Amount in Figures</u>
1	L.S.	All work required to construct the Filippello Park Spray Pad Renovation	_____

Total Bid Price\$ _____
Lump Sum (Amount in Words)

PART II - ADD ALTERNATE PRICES

None

PART III - SUPPLEMENTAL UNIT PRICES

Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those on which the Contract Sum is based, by order or approval of the Owner, the undersigned agrees that the following supplemental unit prices may be used as the basis of payment to him/her or credit to the Owner for such addition, increase, or decrease in the work as determined solely by the Owner.

Supplemental unit prices shall cover all costs, complete in place, and the prices given shall represent the exact amount per unit to be paid to the Contractor (in the case of Additions or increases) or to be deducted from payments to the Contractor for park improvements under Part 1 of the Bid refunded to the Owner (in the case of Deductions or decreases). No additional adjustments will be allowed for overhead, profit, insurance or other direct or indirect expenses of the Contractor or Subcontractor beyond the prices as listed. Maximum differences between "Add" and "Deduct" prices shall be 20 percent.

<u>Section No.</u>	<u>Unit</u>	<u>ADD</u>	<u>Deduct</u>
334113	Furnish and install asphalt concrete pathway pavement	\$_____/sy	\$_____/sy
334113	Furnish and install 1 1/2-inch copper water pipe complete and in place	\$_____/lf	\$_____/lf

The undersigned agrees that extra work, if any, will be performed and will be paid for in accordance with Article 11 of the Conditions of the Contract.

Amounts shall be shown in both words and figures, where indicated. In case of discrepancy, the amount shown in words will govern.

The above prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance and incidentals required to complete the Work.

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

(Give first and last names in full. In the case of a corporation, see Article 8.3 of the Instructions to Bidders, in the case of a limited liability company (LLC), see Article 8.4 of the Instructions to Bidders, in the case of a partnership, see Article 8.5 of the Instructions to Bidders.)

Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

The undersigned hereby certifies that he/she 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.

The undersigned hereby 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 section, the word "person" shall mean any natural person, joint venture, partnership, corporation, limited liability company, 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 requisition promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

Social Security Number
or Federal Identification
Number

Signature of Individual or
Corporate Name

By: _____
Corporate Officer (if applicable)

Notice of acceptance should be mailed, faxed, or delivered to the following:

(Name)

By: _____
(Title)

(Business Address)

(City and State)

Date: _____

If the Bidder is a corporation, indicate State of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses, if different from business address.

CERTIFICATE OF GOOD FAITH (NON-COLLUSION) and TAX COMPLIANCE

Pursuant of M.G.L. Ch. 62C, Sec. 49A, I certify under the pains and penalties of perjury that the contractor/consultant has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

The undersigned certifies under penalties of perjury that this bid has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals.

Name of Person Signing Bid (Please Print)

Signature of Person Signing Bid

Company

CERTIFICATE OF VOTE (required if Contractor is a Corporation)

I, _____, hereby certify that I am duly qualified and Acting Secretary of _____ and I further certify that a meeting of the Directors of said Company, duly called and held on _____, at which all Directors were present and voting, the following vote was unanimously passed:

Voted to authorize and empower the person signing the Bid Certification Sheet on behalf of the Corporation. I further certify that the above vote is still in effect and has not been changed or modified in any respect.

BY: _____
(Secretary of Corporation)

END OF DOCUMENT 004113

CITY OF WATERTOWN, MASSACHUSETTS

AGREEMENT FOR

THIS AGREEMENT made this ____ day of _____, 20__ by and between the City of _____, a municipal corporation duly organized under the laws of Massachusetts and having a usual place of business at _____, _____, MA _____, acting by and through its _____, hereinafter referred to as the “City”, and _____, a Massachusetts corporation/partnership/sole proprietorship) having a usual place of business at _____, _____, MA _____, hereinafter referred to as the “Contractor”.

WITNESSETH:

Whereas, the City invited the submission of a proposal for _____
“the Project”; and

WHEREAS, the Contractor submitted a proposal in response to said invitation, and the City has awarded the contract therefor to the Contractor.

NOW, THEREFORE, the City and the Contractor agree as follows:

1. Contract Documents. The Contract Documents consist of this Agreement, the purchase description, if any, the Invitation for Bids or Request for Proposals, Instructions to Bidders/Proposers, Scope of Services or Specification, and the quotation, bid or proposal submitted by the Contractor, including negotiated modifications to the Plan of Services, if any. The Contract Documents constitute the entire Agreement between the parties concerning the work, and all are as fully a part of this Agreement as if attached hereto. In the event of a conflict between any of the Contract Documents, the document most favorable to the City, in its sole determination, shall prevail.
2. The Work. The Work consists of _____, as more fully described in the Contract Documents as defined above.
3. Term of Contract. This Agreement shall be in effect from _____ and shall expire on _____, unless terminated earlier pursuant to the terms hereof.
(If the solicitation provided for an option to extend, insert the following: This Agreement may be extended for an additional term of _____, at the sole discretion of the City, and any such option shall not be subject to the acceptance or approval of the Contractor.)

4. Compensation.

A. The City shall pay, as full compensation for items and/or services furnished and delivered in carrying out this Agreement. Total Price \$_____, as set forth in more detail in the Contract Documents.

B. The acceptance by the Contractor of final payment for items and/or services provided shall be deemed a release of the City from any and all claims and liabilities under this Agreement.

C. Neither the City's review, approval or acceptance of, nor payment for any of the items and/or services provided shall be construed to operate as a waiver of any rights of the City under the Agreement or any cause of action arising out of the performance of the Agreement.

5. Payment of Compensation. The City shall make payments as follows:
Once monthly.

6. Liability of the City. The City's liability hereunder shall be to make all payments when they shall become due, and the City shall be under no further obligation or liability. Nothing in this Agreement shall be construed to render the City or any elected or appointed official or employee of the City, or their successors in office, personally liable for any obligation under this Agreement.

7. Independent Contractor. The Contractor acknowledges and agrees that it is acting as an independent contractor for all work and services rendered pursuant to this Agreement, and neither the Contractor, nor its employees, agents, servants nor any person for whose conduct the Contractor is responsible shall be considered an employee or agent of the City for any purpose.

8. Indemnification. The Contractor shall indemnify, defend, and hold the City, Engineer, their officers, directors harmless from and against any and all claims, demands, liabilities, actions, causes of actions, costs and expenses, including attorney's fees, arising out of the Contractor's breach of this Agreement or the negligence or willful misconduct of the Contractor, or the Contractor's agents or employees.

9. Insurance.

A. The Contractor shall obtain and maintain during the term of this Agreement the insurance coverage in companies licensed to do business in the Commonwealth of Massachusetts, and acceptable to the City, as set out in the Invitation for Bids or Request for Proposals, or in Attachment A hereto.

B. All policies shall identify the City, Engineer, their officers, directors as additional insured (except Workers' Compensation) and shall provide that the City shall receive written notification at least 30 days prior to the effective date of any amendment or cancellation. Certificates evidencing all such coverages shall be provided to the City upon the execution of this Agreement, and at least ten (10) days prior to the renewal of any such coverage. Each such certificate shall specifically refer to this Agreement and shall state that such insurance is

as required by this Agreement. Failure to provide or to continue in force such insurance shall be deemed a material breach of this Agreement and shall be grounds for immediate termination.

10. Assignment. The Contractor shall not assign, sublet or otherwise transfer this Agreement, in whole or in part, without the prior written consent of the City, and shall not assign any of the moneys payable under this Agreement, except by and with the written consent of the City.

11. Termination.

A. Termination for Cause. If at any time during the term of this Agreement the City determines that the Contractor has breached the terms of this Agreement by negligently or incompetently performing the work, or any part thereof, or by failing to perform the work in a timely fashion, or by failing to perform the work to the satisfaction of the City, or by not complying with the direction of the City or its agents, or by otherwise failing to perform this Agreement in accordance with all of its terms and provisions, the City shall notify the Contractor in writing stating therein the nature of the alleged breach and directing the Contractor to cure such breach within ten (10) days. The Contractor specifically agrees that it shall indemnify and hold the City harmless from any loss, damage, cost, charge, expense or claim arising out of or resulting from such breach regardless of its knowledge or authorization of the actions resulting in the breach. If the Contractor fails to cure said breach within ten (10) days, the City may, at its election at any time after the expiration of said ten (10) days, terminate this Agreement by giving written notice thereof to the Contractor specifying the effective date of the termination. Upon receipt of said notice, the Contractor shall cease to incur additional expenses in connection with this Agreement. Upon the date specified in said notice, this Agreement shall terminate. Such termination shall not prejudice or waive any rights or action which the City may have against the Contractor up to the date of such termination, and the Contractor shall be liable to the City for any amount which it may be required to pay in excess of the compensation provided herein in order to complete the work specified herein in a timely manner. Upon such termination, the Contractor shall be entitled to compensation for all satisfactory work completed prior to the termination date, as determined by the City.

B. Termination for Convenience. The City may terminate this Agreement at any time for convenience by providing the Contractor written notice specifying therein the termination date which shall not be sooner than ten days from the issuance of said notice. Upon receipt of said notice, the Contractor shall cease to incur additional expenses in connection with this Agreement. Upon such termination, the Contractor shall be entitled to compensation for all satisfactory work completed prior to the termination date, as determined by the City, such payment not to exceed the fair value of the services provided hereunder.

12. Inspection and Reports. The City shall have the right at any time to inspect the work of the Contractor, including the right to enter upon any property owned or occupied by Contractor, whether situated within or beyond the limits of the City. Whenever requested, Contractor shall immediately furnish to the City full and complete written reports of its operation under this Agreement in such detail and with such information as the City may request.

13. Royalties and Patents: The Contractor shall pay all applicable royalties and license fees. In addition, the Contractor hereby represents that it is duly authorized to use any process or other intellectual property rights held by third parties in the performance of this Agreement, it shall defend all suits or claims for infringement of any patent or other intellectual property rights and shall indemnify and hold the City harmless from loss on account thereof.
14. Successor and Assigns. This Agreement is binding upon the parties hereto, their successors, assigns and legal representatives. Neither the City nor the Contractor shall assign or transfer any interest in the Agreement without the written consent of the other. Notwithstanding the approval of any assignment by the City pursuant to this paragraph, the Contractor shall remain liable for the full performance of the terms of this Contract.
15. Compliance with Laws. The Contractor shall comply with all Federal, State and local laws, rules, regulations and orders applicable to the work provided pursuant to this Agreement, such provisions being incorporated herein by reference, and shall be responsible for obtaining all necessary licenses, permits, and approvals required for the performance of such work. The Contractor shall indemnify and hold the City harmless for and against any and all fines, penalties or monetary liabilities incurred by the City as a result of the failure of the Contractor to comply with the previous sentence.
16. Notice. Any and all notices, or other communications required or permitted under this Agreement, shall be in writing and delivered by hand or mailed postage prepaid, return receipt requested, by registered or certified mail or by other reputable delivery service, to the parties at the addresses set forth on Page 1 or furnished from time to time in writing hereafter by one party to the other party. Any such notice or correspondence shall be deemed given when so delivered by hand, if so mailed, when deposited with the U.S. Postal Service or, if sent by private overnight or other delivery service, when deposited with such delivery service.
17. Severability. If any term or condition of this Agreement or any application thereof shall to any extent be held invalid, illegal or unenforceable by the court of competent jurisdiction, the validity, legality, and enforceability of the remaining terms and conditions of this Agreement shall not be deemed affected thereby unless one or both parties would be substantially or materially prejudiced.
18. Governing Law. This Agreement shall be governed by, construed and enforced in accordance with the laws of the Commonwealth of Massachusetts and the Contractor submits to the jurisdiction of any of its appropriate courts for the adjudication of disputes arising out of this Agreement.
19. Entire Agreement. This Agreement, including all documents incorporated herein by reference, constitutes the entire integrated agreement between the parties with respect to the matters described. This Agreement supersedes all prior agreements, negotiations and representations, either written or oral, and it shall not be modified or amended except by a written document executed by the parties hereto.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first written above.

I certify that an appropriation
is available in the amount of this
Contract.

CITY OF WATERTOWN

City Auditor

By: _____
City Manager

Approved as to Form:

(Contractor)

City Attorney

By: _____

Name: _____
(Type or Print)

Title: _____

PERFORMANCE BOND

CONTRACTOR *(name and address):*

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

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

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

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

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

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

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

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

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

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

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

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

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

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

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

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

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

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

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

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the

Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

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

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

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

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

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

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

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

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

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

the Owner or its heirs, executors, administrators, successors, and assigns.

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

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

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

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

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including

allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

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

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

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

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

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

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

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

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

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

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

By: _____

Signature

Print Name

Title

Attest: _____

Signature

Title

(seal)

Surety's Name and Corporate Seal

By: _____

Signature *(attach power of attorney)*

Print Name

Title

Attest: _____

Signature

Title

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

13).

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

Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

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

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

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

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

18. Modifications to this Bond are as follows:

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer

concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to

conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives*:
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

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

D. *Defective*:

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide*:

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner's Insurance:* After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

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

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations:*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check

and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and

binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the

Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
 - E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
 - F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
 - G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site,

adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
2. is of such a nature as to require a change in the Drawings or Specifications; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection

therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
 - 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study

of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
- 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
- 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents,

or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Possible Price and Times Adjustments:*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such

actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.

4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may

be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
 - C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
 - D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 - E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
 - F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and

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damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and

- 3) be suited to the same use as that specified.
- b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

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

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

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

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

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals

and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

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

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them

in the protection, removal, relocation, and replacement of their property or work in progress.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a

change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding

the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying,

disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any

Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
 - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 - 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 - 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

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thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
3. by manufacturers of equipment furnished under the Contract Documents;
4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective

Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

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

E. *Reductions in Payment by Owner:*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and

accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
 - C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
 - D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
 - E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be

construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 007300 - SUPPLEMENTARY CONDITIONS

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SECTION 007300 SUPPLEMENTARY CONDITIONS

PART I - AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC Document No. C-700, 2013 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01A.38.

Delete paragraph 1.01A.38. of the General Conditions in its entirety and replace with the following:

38. Specifications - Sections included under Division 01 through Division 33 of the Project Manual.

SC-1.01A.40.

Insert the following at the beginning of the definition before the words “The time at.....”

The Work required by the Contract has been completed except for work having a Contract Price of less than one per cent of the then adjusted total contract price, or

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.01C.

Delete Paragraph 2.01C of the General Conditions in its entirety.

ARTICLE 3 - DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01E.

Add the following new paragraph immediately after Paragraph 3.01E. of the General Conditions which is to read as follows:

F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01A.

Delete Paragraph 4.01A of the General Conditions in its entirety and replace with the following:

A. The Contract Time will commence to run on the twentieth day following the Effective Date of the Agreement.

SC-4.03A.

Add the following new paragraph immediately after Paragraph 4.03A of the General Conditions which is to read as follows:

B. Engineer may check the lines, elevations, reference marks, batter boards, etc., set by Contractor, and Contractor shall correct any errors disclosed by such check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate construction of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades.

ARTICLE 5 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.01A.

Add the following new paragraph immediately after Paragraph 5.01A. of the General Conditions which is to read as follows:

1. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, Contractor shall begin the Work upon such land and rights-of-way as Owner has previously acquired.

SC-5.03A.1.

Delete Paragraph 5.03 A.1 of the General Conditions in its entirety and replace it with the following:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents. Engineer has relied upon the data obtained from subsurface investigations made at the site in the form of test pits. Such data is in the form of test pit logs which are included in the Appendix to the Project Manual. The locations of the test pits are indicated on the Drawings.

SC-5.03

Delete Paragraphs 5.03A and 5.03B in their entirety and insert the following:

A. No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.

SC-5.04.D.

Add the following new paragraph immediately after paragraph 5.04D.4. of the General Conditions which is to read as follows:

E. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law Chapter 30, Section 39N included in Part II of the Supplementary Conditions.

SC-5.06

Delete Paragraphs 5.06A and 5.06B in their entirety and insert the following:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site, are known to Owner.

ARTICLE 6 - BONDS AND INSURANCE

SC-6.02C

Add the following paragraphs immediately after Paragraph 6.02C of the General Conditions which are to read as follows:

Contractor shall provide evidence of its insurance coverage on the ACORD certificate of insurance form and shall include the following statement in its entirety in the section of the form entitled "Description of Operations/Locations/Vehicles/Special Items".

The City of Watertown, Massachusetts and CDM Smith, and their officers, directors, partners, employees and other consultants and subcontractors are named as additional insureds with respect to the insured's Commercial General Liability, Automobile Liability and Pollution Liability Insurance Policies. All insurers waive all rights of subrogation against the City of Watertown, Massachusetts and CDM Smith, their officers, directors, partners, employees and other consultants and subcontractors. All insurance is primary for all claims covered thereby. Commercial General Liability Insurance includes contractual liability coverage.

SC-6.03

Add the following new paragraph immediately after Paragraph 6.03.J of the General Conditions:

K. Additional Insureds: The City of Watertown, Massachusetts and CDM Smith, and their officers, directors, partners, employees and other consultants and subcontractors are named as additional insureds. All insurers waive all rights of subrogation against the City of Watertown, Massachusetts and CDM Smith, their officers, directors, partners, employees and other consultants and subcontractors. All insurance is primary for all claims covered thereby. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

1. 6.03.A Workers' Compensation and related coverages

- | | |
|---------------------------|--|
| (1) Worker's Compensation | in accordance with M.G.L. c.149, Sect. 34A,
minimum \$100,000 |
| (2) Employer's Liability | \$500,000 Each Occurrence
\$500,000 Disease per employee |

2. 6.03B. and 6.03C. Commercial General Liability including Premise/Operations; Explosion, Collapse and Underground Property Damage; Products/Completed Operations, Contractual, Independent Contractors; Property Damage; and Personal Injury liabilities:

- | | |
|--------------------|---|
| (1) Bodily Injury: | \$1,000,000 Each Occurrence
\$1,000,000 Annual Aggregate |
|--------------------|---|

- | | | |
|----------------------|-------------|------------------|
| (2) Property Damage: | \$1,000,000 | Each Occurrence |
| | \$1,000,000 | Annual Aggregate |
| (3) Personal Injury: | \$1,000,000 | Annual Aggregate |

3. 6.03D. Comprehensive Automobile Liability including all owned (private and others), hired and non-owned vehicles:

- | | | |
|---|-------------|-----------------|
| (1) Bodily Injury | \$1,000,000 | Each Person |
| | \$1,000,000 | Each Accident |
| (2) Property Damage: Each accident
[or] Combined Single Limit of | \$1,000,000 | Each Occurrence |

4. 6.03E. Umbrella or Excess Liability:

- | | |
|-------------------|-------------|
| Per Occurrence | \$5,000,000 |
| General Aggregate | \$5,000,000 |

SC-6.04A.

Delete Paragraph 6.04A. of the General Conditions in its entirety and replace with the following:

A. Contractor shall purchase and maintain a separate Owner's Protective Liability policy, issued to Owner at the expense of Contractor, including Owner and Engineer as named insured. This insurance shall provide coverage for not less than the following amounts:

- | | | |
|--------------------------|-------------|------------------|
| 6.04A.1. Bodily Injury | \$1,000,000 | Each Occurrence |
| 6.04A.2. Property Damage | \$1,000,000 | Each Occurrence |
| | \$1,000,000 | Annual Aggregate |

SC-6.04B

Delete Paragraph 6.04B of the General Conditions in its entirety and replace with the following:

B. All policies required by this Paragraph 6.04 shall contain provisions to the effect that the insurer(s) waive all rights of subrogation against the Owner, Engineer and their officers, directors, partners, employees and other consultants and subcontractors of each and any of them.

SC 6.05 Property Insurance

SC-6.05. Delete Paragraph 6.05.A of the General Conditions in its entirety.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

SC-7.02

SC-7.02B.

Add the following new paragraphs immediately after Paragraph 7.02B. of the General Conditions which are to read as follows:

C. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or Subcontractor contracting for any part of the Work shall require or permit any laborer or mechanic to be employed on the Work in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times that person's basic rate of pay for all hours worked in excess of forty hours in such work week.

D. Contractor shall employ only competent persons to do the work and whenever Owner shall notify Contractor, in writing, that any person on the Work appears to be incompetent, disorderly, or otherwise unsatisfactory, such person shall be removed from the Project and shall not again be employed on it except with the consent of Owner.

E. Contractor and Subcontractors shall, insofar as practicable, give preference in the hiring of workers for the Project to qualified local residents with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

F. Contractor and all subcontractors shall comply with the Massachusetts Prevailing Wage law as contained in M.G.L. chapter 149 sections 26-27 which are included in Part II of these Supplementary Conditions.

SC-7.06I.

Add the following new sentence at the end of Paragraph 7.06I. of the General Conditions to read as follows:

Contractor shall make payments to Subcontractors in accordance with Massachusetts General Law Chapter 30, Section 39F which is included in Part II of these Supplementary Conditions.

SC-7.07B

Delete Paragraph 7.07B of the General Conditions in its entirety.

SC-7.09A

Add the following new sentences at the end of Paragraph 7.09A of the General Conditions to read as follows:

The materials and supplies to be used in the Work of this Contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of Chapter 14 of the Acts of 1966 and any amendments thereto.

SC-7.15A.

Delete the last sentence in Paragraph 7.15A. of the General Conditions in its entirety and replace with the following:

If Engineer determines that the incident giving rise to the emergency action was not the responsibility of the Contractor and that a change in the Contract Document is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

SC-7.17A.

Add the following new paragraph immediately after Paragraph 7.17A. of the General Conditions which is to read as follows:

B. The Contractor guarantees that the Work and Services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of substantial completion. If part of the Work is accepted in accordance with Paragraph 15.04 of the General Conditions, the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

1. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, corrections or replacements to the satisfaction of the Owner within seven (7) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make said repairs, correction or replacements, and charge the costs, including compensation for additional professional services, to the Contractor.

2. The Contractor's guarantee under Paragraphs 7.17A and 7.17B, is in addition to the Contractor's express or implied warranties under this Contract and State law and in no way diminish any other rights that the Owner may have against the Contractor.

SC-7.17B., C. and D.

Renumber Paragraphs 7.17B., 7.17C and 7.17D. of the General Conditions to read 7.17C., 7.17D. and 7.17E.

SC-7.17E.

Add the following new paragraph immediately after Paragraph 7.17E. of the General Conditions which is to read as follows:

F. Manufacturer's Guaranty/Warranty

1. The Contractor shall obtain the following guaranty/warranty from the manufacturer of all major pieces of equipment furnished and installed on this Project. Such guaranty/warranty shall be for the benefit of Owner and be furnished in writing by the manufacturer. The Contractor's and manufacturer's obligations under this provision are in addition to other express or implied warranties under the Contract Documents and under the law and in no way diminish any other right that the Owner may have against the Contractor or manufacturer for faulty material, equipment or work. The warranty period shall not be interpreted as a limitation on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

2. The manufacturer warrants and guarantees for a period of one year from the date of Substantial Completion, or such longer period that may be specified in the Contract Documents, that all materials and equipment furnished and installed shall be free from flaws, defects in material and workmanship and shall be in conformance with the Contract Documents.

SC-7.18A.

Delete Paragraph 7.18A of the General Conditions in its entirety and replace with the following:

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall defend, indemnify and hold harmless Owner, Engineer and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost or loss or damage:

1. is attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such indemnified party unless caused by the sole negligence of a party indemnified hereunder. If through the acts of neglect on the part of Contractor, any other contractor or any Subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other contractor or Subcontractor by agreement or arbitration if such other contractor or Subcontractor will so settle. If such other contractor or Subcontractor shall assert any claim against Owner and/or Engineer, or the officers, directors, members, partners, employees, agents, consultants and subcontractors of each on account of any damage alleged to have been sustained, Owner shall notify Contractor, who shall defend, indemnify and save harmless Owner, Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each against any such claims.

SC-7.18C.

Delete Paragraphs 7.18C, C.1 and C.2 of the General Conditions in their entirety.

SC-7.19E.

Add the following new paragraph immediately after Paragraph 7.19E. of the General Conditions which is to read as follows:

SC-7.20 Definitions; Contract Provisions; Management and Financial Statements; Enforcement

A. Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records which is included in PART II of the Supplementary Conditions.

ARTICLE 8. OTHER WORK AT THE SITE

SC -8.03 A

Delete paragraph 8.03 A of the General Conditions in its entirety and replace with the following.

A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall not institute any action, legal or equitable, against Owner, Engineer, Engineer's Consultants or the Construction Coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, Engineer's Consultants or the Construction Coordinator on account of any such damage or claim. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, Engineer's Consultants and Construction Coordinator for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from Owner, Engineer, Engineer's Consultant or Construction Coordinator for activities that are their respective responsibilities.

SC-8.03D.

Delete Paragraph 8.03 D of the General Conditions in its entirety and replace with the following.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, Engineer's Consultants, the Construction Coordinator or any person then Contractor shall promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, Contractor shall, to the fullest extent permitted by Laws and Regulations defend, indemnify and hold Owner, Engineer, Engineer's Consultants and the Construction Coordinator harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals, and court and arbitration or mediation costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against Owner, Engineer, Engineer's Consultants or the Construction Coordinator to the extent based on a claim arising out of Contractor's performance of the Work.

ARTICLE 9. OWNER'S RESPONSIBILITIES

SC-9.06

Delete Paragraph 9.06 of the General Conditions in its entirety.

SC-9.13

Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions which is to read as follows:

SC-9.13 Owner's Site Representative

A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee.

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

Add the following new paragraphs immediately after Paragraph 10.03A of the General Conditions which are to read as follows:

B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
4. Liaison:
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

6. Shop Drawings and Samples:

- a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
- b. Receive Samples which are furnished at the Site by Contractor and notify Engineer of availability of Samples for examination.
- c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.

7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

8. Review of Work and Rejection of Defective Work:

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

9. Inspections, Tests, and System Start-ups:

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

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

- c. Maintain records for use in preparing Project documentation.

11. Reports:

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

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

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

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
- 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
- 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11 - AMENDING THE CONTRACT DOCUMENTS: CHANGES IN THE WORK

SC-11.04C.2.b.

In paragraph 11.04C.2.b, before the semicolon add the following words "based on subcontractor's Cost of the Work";

ARTICLE 13 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01B.1.

Delete the second sentence in paragraph 13.01B.1. of the General Conditions in its entirety and replace with the following:

Such employees shall include foremen at the site.

ARTICLE 14 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-14.06A.

Add the following new paragraph immediately after Paragraph 14.06A. of the General Conditions which is to read as follows:

B. If Owner stops Work under Paragraph 14.06A. Contractor shall not be entitled to any extension of Contract Time or increase in Contract Price.

ARTICLE 15 - PAYMENTS TO CONTRACTOR, SET-OFFS, AND COMPLETION; CORRECTION PERIOD

SC-15.01B.3.

Add the following new paragraph immediately after paragraph 15.01B.3 of the General Conditions which is to read as follows:

4. Contractor shall furnish evidence that payment received on the basis of materials and equipment not incorporated and suitably stored, has in fact been paid to the respective supplier(s) within sixty days of payment by Owner. Failure to provide such evidence of payment may result in the withdrawal of previous approval(s) and removal of the cost of related materials and equipment from the next submitted Application for Payment.

SC-15.01C.1

Delete paragraph 15.01C.1. of the General Condition in its entirety and replace with the following:

1. Progress Payments will be made in accordance with Massachusetts General Law Chapter 30, Section 39G, which is included in PART II of these Supplementary Conditions.

SC-15.02

Add the following new paragraphs immediately after Paragraph 15.02A of the General Conditions which are to read as follows:

B. No materials or supplies for the Work shall be purchased by Contractor or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. Contractor warrants that Contractor has good title to all materials and supplies used by Contractor in the Work, free from all liens, claims or encumbrances.

C. Contractor shall defend, indemnify and save Owner and Engineer harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. Contractor shall at Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If Contractor fails to do so, then Owner may, after having served written notice on the said Contractor either pay unpaid bills, of which Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon Owner to either Contractor or Contractor's Surety. In paying any unpaid bills of the Contractor, Owner shall be deemed the agent of Contractor and any payment so made by Owner shall be considered as payment made under the Contract by Owner to Contractor and Owner shall not be liable to Contractor for any such payment made in good faith.

SC-15.06B.1.

Delete paragraph 15.06B.1. of the General Conditions in its entirety and replace with the following:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will indicate in writing Engineer's recommendation of payment and present the Application to Owner for payment. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 15.07. Otherwise, Engineer will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the

necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Massachusetts General Law, pay Contractor the amount recommended by Engineer.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

SC-16.01A.

Delete Paragraph 16.01A. of the General Conditions in its entirety and replace with the following:

A. Owner may order, at any time and without cause, suspension of the Work in accordance with Massachusetts General Law Chapter 30, Section 39O, which is included in PART II of the Supplementary Conditions.

SC-16.02A.4.

Add the following new paragraph immediately after paragraph 16.02.A.4 of the General Conditions which is to read as follows:

5. If Contractor abandons the Work, or sublets this Contract or any part thereof, without the previous written consent of Owner, or if the Contract or any claim thereunder shall be assigned by Contractor otherwise than as herein specified;

ARTICLE 17 - FINAL RESOLUTION OF DISPUTES

SC-17.01B

Delete paragraph 17.01B.1 of the General Conditions in its entirety and replace with the following:

1. Either Owner or Contractor may request mediation of any Claim. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of this Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract.

SC-17.01B.3.

Add a new paragraph immediately after paragraph 17.01B.3. of the General Conditions which is to read as follows:

C. Contractor shall carry on the Work and maintain the progress schedule during the dispute resolution proceedings, unless otherwise agreed by Contractor and Owner in writing.

ARTICLE 18 - MISCELLANEOUS

SC-18.08

Add the following new paragraphs immediately after Paragraph 18.08 of the General Conditions which are to read as follows:

18.09 Addresses

A. Both the address given in the Bid Form upon which this Agreement is founded, and Contractor's office at or near the site of the Work are hereby designated as places to either of which notices, letters, and other communications to Contractor shall be certified, mailed, or delivered. The delivering at the above named place or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon Contractor; and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by Contractor, and delivered to Owner and Engineer. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon Contractor personally.

18.10 Wage Rates

A. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be a part of these Contract Documents. A copy of the wage schedule is included in PART II of these Supplementary Conditions. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such person shall be paid at not less than such rates as shall be determined by the officials administering the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. Contractor shall notify Owner of Contractor's intention to employ persons in trades or occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations.

B. The schedule of wages referred to above are minimum rates only, and Owner will not consider any claims for additional compensation made by Contractor because of payment by Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes between Contractor and employees of Contractor in regard to the payment of wages in excess of these specified in the schedule shall be resolved by Contractor.

C. The said schedule of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedule shall be kept posted in a conspicuous place at the site of the work.

PART II - STATE AND LOCAL GOVERNMENT PROVISIONS

State and Local Government Provisions included herein, have been selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contract shall be deemed to be also inserted herein in accordance with Paragraph 3.01F of the Supplementary Conditions.

1.0. COMMONWEALTH OF MASSACHUSETTS PROVISIONS

1.1. Owner and Contractor agree that the following Commonwealth of Massachusetts Provisions apply to the work to be performed under this Contract and that these provisions supersede any conflicting provisions of this Contract.

1.2. Massachusetts General Laws

1.2.1. Chapter 30, Section 39F (9 Pages)

1.2.2. Chapter 30, Section 39G (6 Pages)

1.2.3. Chapter 30, Section 39I (2 Pages)

1.2.4. Chapter 30, Section 39J (2 Pages)

1.2.5. Chapter 30, Section 39L (2 Pages)

1.2.6. Chapter 30, Section 39M (8 Pages)

1.2.7. Chapter 30, Section 39N (2 Pages)

1.2.8. Chapter 30, Section 39O (3 Pages)

1.2.9. Chapter 30, Section 39P (2 Pages)

1.2.10. Chapter 30, Section 39Q (4 Pages)

1.2.11. Chapter 30, Section 39R (7 Pages)

1.2.12. Chapter 30, Section 39S (3 Pages)

1.2.13. Chapter 82, Sections 40 and 40A through 40E (11 Pages)

1.2.14. Chapter 82A, Section 1 (3 Pages)

1.2.16. Chapter 149, Section 34 (2 Pages)

1.2.17. Chapter 149, Section 44J (4 Pages)

1.2.18. Price Adjustments for certain materials in Construction Projects. MGL Chapter 30 Section 38A.
(Appendix H – 5 Pages).

1.3. State Wage Rates

END OF SECTION 007300

COMMONWEALTH OF MASSACHUSETTS PROVISIONS

Part I ADMINISTRATION OF THE GOVERNMENT**Title III** LAWS RELATING TO STATE OFFICERS**Chapter 30** GENERAL PROVISIONS RELATIVE TO STATE
DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39F** CONSTRUCTION CONTRACTS; ASSIGNMENT AND
SUBROGATION; SUBCONTRACTOR DEFINED;
ENFORCEMENT OF CLAIM FOR DIRECT PAYMENT;
DEPOSIT, REDUCTION OF DISPUTED AMOUNTS

Section 39F. (1) Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount

specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a

payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be

delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be

earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on

deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as

provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding

authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

Part I ADMINISTRATION OF THE GOVERNMENT**Title III** LAWS RELATING TO STATE OFFICERS**Chapter 30** GENERAL PROVISIONS RELATIVE TO STATE
DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39G** COMPLETION OF PUBLIC WORKS; SEMI-FINAL AND
FINAL ESTIMATES; PAYMENTS; EXTRA WORK;
DISPUTED ITEMS

Section 39G. Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and, water mains, airports and other public works, the contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the

work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

Within sixty-five days after the effective date of a declaration of a substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quantity and price of the work done and all but one per cent retainage, if held by the awarding authority, on that work, including the quantity, price and all but one per cent retainage, if held by the awarding authority, for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payment filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section thirty-nine F, but no contract subject to said section thirty-nine F

shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by this section on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and, unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return

receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority shall prepare and forthwith send to the contractor for acceptance a final estimate for the quantity and price of the work done and all retainage, if held by the awarding authority, on that work less all payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and send to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as

hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the date of payment. Within 15 days, 30 days in the case of the commonwealth, after receipt from the contractor, at the place designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its

estimate of the fair value of its claims against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and a retention to secure satisfactory performance of the contractual work not exceeding five per cent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section thirty-nine F of chapter thirty; provided, that a five per cent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

Substantial completion, for the purposes of this section, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one per cent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

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DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39I** DEVIATIONS FROM PLANS AND SPECIFICATIONS

Section 39I. Every contractor having a contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or public works for the commonwealth, or of any political subdivision thereof, shall perform all the work required by such contract in conformity with the plans and specifications contained therein. No wilful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the engineer or architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such

engineer or architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the contracting agency and the contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the contracting authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section wilfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both.

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DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39J** PUBLIC CONSTRUCTION CONTRACTS; EFFECT OF
DECISIONS OF CONTRACTING BODY OR
ADMINISTRATIVE BOARD

Section 39J. Notwithstanding any contrary provision of any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount of the contract is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, a decision, by the contracting body or by any administrative board, official or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall

not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily is unsupported by substantial evidence, or is based upon error of law.

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EMPLOYEES**Section 39L** PUBLIC CONSTRUCTION WORK BY FOREIGN
CORPORATIONS; RESTRICTIONS AND REPORTS

Section 39L. The commonwealth and every county, city, town, district, board, commission or other public body which, as the awarding authority, requests proposals, bids or sub-bids for any work in the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or other public works (1) shall not enter into a contract for the work with, and shall not approve as a subcontractor furnishing labor and materials for a part of the work, a foreign corporation which has not filed with the awarding authority a certificate of the state secretary stating that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by

section 16.22 of subdivision B of Part 16 of said chapter 156D, and (2) shall report to the state secretary and to the department of corporations and taxation any foreign corporation performing work under such contract or subcontract, and any person, other than a corporation, performing work under such contract or subcontract, and residing or having a principal place of business outside the commonwealth.

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DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39M** CONTRACTS FOR CONSTRUCTION AND MATERIALS;
MANNER OF AWARDING

Section 39M. (a) Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is and estimated by the awarding authority to cost less than \$10,000 dollars shall be obtained through the exercise of sound business practices as defined in section 2 of chapter 30B. The awarding authority shall make and keep a record of each procurement that, at a minimum, shall include the name and address of the person from whom the services were procured. An awarding authority that utilizes a vendor on a statewide contract procured through the

operational services division, or a blanket contract procured by the awarding authority pursuant to this section, shall be deemed to have obtained the contract through sound business practices.

Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is estimated by the awarding authority to cost not less than \$10,000 but not more than \$50,000 shall be awarded to the responsible bidder offering to perform the contract at the lowest price. The awarding authority shall make public notification of the contract and shall seek written responses from no fewer than 3 persons who customarily perform such work. For purposes of this subsection, the term "public notification" shall include, but need not be limited to, posting, at least 2 weeks before the time specified in the notification for the receipt of responses, the contract and scope-of-work statement: (1) on the website of the awarding authority, (2) on the COMMBUYS system administered by the operational services division, (3) in the central register published pursuant to section 20A of chapter 9 and (4) in a conspicuous place in or near the primary office of the awarding authority; provided, however, that if the awarding authority obtains a minimum of 2 written responses from a vendor list established through a blanket contract or a statewide contract procured through the operational services division, and the lowest of those written responses is deemed acceptable to the awarding

authority, public notification is not required. The solicitation shall include a scope-of-work statement that defines the work to be performed and provides potential responders with sufficient information regarding the objectives and requirements of the awarding authority and the time period within which the work shall be completed. The awarding authority shall record the names and addresses of all persons from whom written responses were sought, the names of the persons submitting written responses and the date and amount of each written response.

An awarding authority may utilize a vendor list established through a statewide contract procured through the operational services division to identify 1 or more of the persons from whom it will seek written responses for purposes of this subsection. An awarding authority may also procure a blanket contract to establish a listing of vendors in certain defined categories of work that are under contract to provide services for multiple individual tasks of not more than \$50,000 each, and from whom written responses will be sought. Any such blanket contract procured by the awarding authority shall be procured pursuant to this section or sections 44A to 44J, inclusive, of chapter 149 which are applicable to projects over \$50,000.

Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is estimated by the awarding authority to

cost more than \$50,000, and every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency, as defined by subsection (1) of section 44A of chapter 149, estimated to cost more than \$50,000 but not more than \$150,000, shall be awarded to the lowest eligible responsible bidder on the basis of competitive bids publicly opened and read by the awarding authority forthwith upon expiration of the time for the filing thereof; provided, however, that such awarding authority may reject any and all bids, if it is in the public interest to do so. Every bid for such contract shall be accompanied by a bid deposit in the form of: (1) a bid bond, (2) cash, or (3) a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company, payable to the awarding authority. The amount of the bid deposit shall be 5 per cent of the value of the bid. Any person submitting a bid pursuant to this section shall, on such bid, certify as follows:

The undersigned certifies under 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 paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

(Name of person signing bid)

(Company)

This subsection shall not apply to the award of any contract subject to the provisions of sections 44A to 44J, inclusive, of chapter 149 and every such contract shall continue to be awarded as provided therein. In cases of extreme emergency: (1) caused by enemy attack, sabotage or other such hostile actions or (2) resulting from an imminent security threat explosion, fire, flood, earthquake, hurricane, tornado or other such catastrophe, an awarding authority may, without competitive bids and notwithstanding any general or special law, award contracts otherwise subject to this subsection to perform work and to purchase or rent materials and equipment, all as may be necessary for temporary repair and restoration to service of any and all public work in order to preserve the health and safety of persons or property; provided, that this exception shall not apply to any permanent reconstruction, alteration, remodeling or repair of any public work.

(b) Specifications for such contracts, and specifications for contracts awarded pursuant to the provisions of said sections forty-four A to forty-four L of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefor, in either instance such writing to be prepared after reasonable

investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if, in the opinion of the awarding authority: (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said name or described materials.

(c) The term "lowest responsible and eligible bidder" shall mean the bidder: (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) who shall certify, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (3) who shall certify that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll

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

(d) The provisions of this section shall not apply (1) to the extent that they prevent the approval of such specifications by any contributing federal agency, (2) to materials purchased under specifications of the state department of highways at prices established by the said department pursuant to advertisement and bidding in connection with work to be performed under the provisions of chapter eighty-one or chapter ninety, (3) to any transaction between the commonwealth and any of its political subdivisions or between the commonwealth and any public service corporation, and (4) to any contract of not more than \$50,000 awarded by a governmental body, as defined by section two of chapter thirty B, in accordance with the provisions of section five of said chapter thirty B; and (5) to any contract solely for the purchase of material awarded by a governmental body, as

defined by section 2 of chapter 30B, in accordance with section 5 of said chapter 30B, or procured through the operational services division pursuant to sections 22 and 52 of chapter 7.

(e) The word "material" as used in this section shall mean and include any article, assembly, system, or any component part thereof.

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DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39N** CONSTRUCTION CONTRACTS; EQUITABLE ADJUSTMENT
IN CONTRACT PRICE FOR DIFFERING SUBSURFACE OR
LATENT PHYSICAL CONDITIONS

Section 39N. Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may

request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

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EMPLOYEES**Section 39O** CONTRACTS FOR CONSTRUCTION AND MATERIALS;
SUSPENSION, DELAY OR INTERRUPTION DUE TO ORDER
OF AWARDING AUTHORITY; ADJUSTMENT IN
CONTRACT PRICE; WRITTEN CLAIM

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and

(b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any

costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

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DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39P** CONTRACTS FOR CONSTRUCTION AND MATERIALS;
AWARDING AUTHORITY'S DECISIONS ON
INTERPRETATION OF SPECIFICATIONS, ETC.; TIME
LIMIT; NOTICE

Section 39P. Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the

submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

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Section 39Q CONTRACTS FOR CAPITAL FACILITY CONSTRUCTION;
CONTENTS; ANNUAL CLAIMS REPORT

Section 39Q. (1) Every contract awarded by any state agency as defined by section thirty-nine A of chapter seven for the construction, reconstruction, alteration, remodeling, repair or demolition of any capital facility as defined by the aforesaid section thirty-nine A shall contain the following subparagraphs (a) through (d) in their entirety:

(a) Disputes regarding changes in and interpretations of the terms or scope of the contract and denials of or failures to act upon claims for payment for extra work or materials shall be resolved according to the following procedures, which shall constitute the exclusive method for resolving such disputes. Written notice of the matter in dispute shall be submitted promptly by the claimant

to the chief executive official of the state agency which awarded the contract or his designee. No person or business entity having a contract with a state agency shall delay, suspend, or curtail performance under that contract as a result of any dispute subject to this section. Any disputed order, decision or action by the agency or its authorized representative shall be fully performed or complied with pending resolution of the dispute.

(b) Within thirty days of submission of the dispute to the chief executive official of the state agency or his designee, he shall issue a written decision stating the reasons therefor, and shall notify the parties of their right of appeal under this section. If the official or his designee is unable to issue a decision within thirty days, he shall notify the parties to the dispute in writing of the reasons why a decision cannot be issued within thirty days and of the date by which the decision shall issue. Failure to issue a decision within the thirty-day period or within the additional time period specified in such written notice shall be deemed to constitute a denial of the claim and shall authorize resort to the appeal procedure described below. The decision of the chief executive official or his designee shall be final and conclusive unless an appeal is taken as provided below.

(c) Within twenty-one calendar days of the receipt of a written decision or of the failure to issue a decision as stated in the preceding subparagraph, any aggrieved party may file a notice of claim for an adjudicatory hearing with the division of hearing officers or the aggrieved party may file an action directly in a

court of competent jurisdiction and shall serve copies thereof upon all other parties in the form and manner prescribed by the rules governing the conduct of adjudicatory proceedings of the division of hearing officers. In the event an aggrieved party exercises his option to file an action directly in court as provided in the previous sentence, the twenty-one day period shall not apply to such filing and the period of filing such action shall be the same period otherwise applicable for filing a civil action in superior court. The appeal shall be referred to a hearing officer experienced in construction law and shall be prosecuted in accordance with the formal rules of procedure for the conduct of adjudicatory hearings of the division of hearing officers, except as provided below. The hearing officer shall issue a final decision as expeditiously as possible, but in no event more than one hundred and twenty calendar days after conclusion of the adjudicatory hearing, unless the decision is delayed by a request for extension of time for filing post-hearing briefs or other submissions assented to by all parties. Whenever, because an extension of time has been granted, the hearing officer is unable to issue a decision within one hundred and twenty days, he shall notify all parties of the reasons for the delay and the date when the decision will issue. Failure to issue a decision within the one hundred and twenty-day period or within the additional period specified in such written notice shall give the petitioner the right to pursue any legal remedies available to him without further delay.

(d) When the amount in dispute is less than ten thousand dollars, a contractor who is party to the dispute may elect to submit the appeal to a hearing officer experienced in construction law for expedited hearing in accordance with the informal rules of practice and procedure of the division of hearing officers. An expedited hearing under this subparagraph shall be available at the sole option of the contractor. The hearing officer shall issue a decision no later than sixty days following the conclusion of any hearing conducted pursuant to this subparagraph. The hearing officer's decision shall be final and conclusive, and shall not be set aside except in cases of fraud.

(2) The commissioner of administration shall require the division of hearings officers to prepare annually a report concerning the construction contract claims submitted to the division during the preceding twelve months, in such form as the commissioner shall prescribe. The report shall contain, at a minimum, the following information: the number of claims submitted; the names of all parties to each such claim; a brief description of the claim; the date of submission and of disposition of the claim; its disposition, whether by settlement, withdrawal, default or written decision; and the number of claims currently pending. The original of the report shall be submitted to the commissioner of administration by January fifteenth, and a copy shall be filed with the state librarian and shall be a public document.

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Section 39R KEEPING AND MAINTAINING OF BOOKS, RECORDS AND
ACCOUNTS; STATEMENT OF MANAGEMENT ON
INTERNAL ACCOUNTING CONTROL; FINANCIAL
STATEMENTS; ENFORCEMENT

Section 39R. (a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

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

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

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

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

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

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

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

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

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said

description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

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

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

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

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

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

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

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

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

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

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

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

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

Part I ADMINISTRATION OF THE GOVERNMENT**Title III** LAWS RELATING TO STATE OFFICERS**Chapter 30** GENERAL PROVISIONS RELATIVE TO STATE
DEPARTMENTS, COMMISSIONS, OFFICERS AND
EMPLOYEES**Section 39S** CONTRACTS FOR CONSTRUCTION; REQUIREMENTS

Section 39S. (a) As used in this section the word "person" shall mean any natural person, joint venture, partnership corporation or other business or legal entity. Any person submitting a bid for, or signing a contract to work on, the construction, reconstruction, alteration, remodeling or repair of any public work by the commonwealth, or political subdivision thereof, or by any county, city, town, district, or housing authority, and estimated by the awarding authority to cost more than \$10,000, and any person submitting a bid for, or signing a contract to work on, the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency, estimated to cost more than \$10,000, shall certify on the bid, or contract, under penalties of perjury, as follows:

(1) that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) 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 (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

(b) Any employee found on a worksite subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

(c) The attorney general, or his designee, shall have the power to enforce this section including the power to institute and prosecute proceedings in the superior court to restrain the award of contracts and the performance of contracts in all cases where, after investigation of the facts, he has made a finding that the award or performance has resulted in violation, directly or indirectly, of

subsection (b), and he shall not be required to pay to the clerk of the court an entry fee in connection with the institution of the proceeding.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40** DEFINITIONS

Section 40. The following words, as used in this section and sections 40A to 40E, inclusive, shall have the following meanings:

"Company", natural gas pipeline company, petroleum or petroleum products pipeline company, public utility company, cable television company, and municipal utility company or department that supply gas, electricity, telephone, communication or cable television services or private water companies within the city or town where such excavation is to be made.

"Description of excavation location", such description shall include the name of the city or town, street, way, or route number where appropriate, the name of the streets at the nearest

intersection to the excavation, the number of the buildings closest to the excavation or any other description, including landmarks, utility pole numbers or other information which will accurately define the location of the excavation.

"Emergency", a condition in which the safety of the public is in imminent danger, such as a threat to life or health or where immediate correction is required to maintain or restore essential public utility service.

"Excavation", an operation for the purpose of movement or removal of earth, rock or the materials in the ground including, but not limited to, digging, blasting, augering, backfilling, test boring, drilling, pile driving, grading, plowing in, hammering, pulling in, jacking in, trenching, tunneling and demolition of structures, excluding excavation by tools manipulated only by human power for gardening purposes and use of blasting for quarrying purposes.

"Excavator", any entity including, but not limited to, a person, partnership, joint venture, trust, corporation, association, public utility, company or state or local government body which performs excavation operations.

"Premark", to delineate the general scope of the excavation or boring on the paved surface of the ground using white paint, or stakes or other suitable white markings on nonpaved surfaces. No premarking shall be acceptable if such marks can reasonably

interfere with traffic or pedestrian control or are misleading to the general public. Premarking shall not be required of any continuous excavation that is over 500 feet in length.

"Safety zone", a zone designated on the surface by the use of standard color-coded markings which contains the width of the facilities plus not more than 18 inches on each side.

"Standard color-coded markings", red - electric power lines, cables, conduit or light cables; yellow - gas, oil, street petroleum, or other gaseous materials; orange - communications cables or conduit, alarm or signal lines; blue - water, irrigation and slurry lines; green - sewer and drain lines; white - premark of proposed excavation.

"System", the underground plant damage prevention system as defined in section 76D of chapter 164.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40A** EXCAVATIONS; NOTICE

Section 40A. No excavator installing a new facility or an addition to an existing facility or the relay or repair of an existing facility shall, except in an emergency, make an excavation, in any public or private way, any company right-of-way or easement or any public or privately owned land or way, unless at least 72 hours, exclusive of Saturdays, Sundays and legal holidays but not more than 30 days before the proposed excavation is to be made, such excavator has premarked not more than 500 feet of the proposed excavation and given an initial notice to the system. Such initial notice shall set forth a description of the excavation location in the manner as herein defined. In addition, such initial notice shall indicate whether any such excavation will involve blasting and, if so, the date and the location at which such blasting is to occur.

The notice requirements shall be waived in an emergency as defined herein; provided, however, that before such excavation begins or during a life-threatening emergency, notification shall be given to the system and the initial point of boring or excavation shall be premarked. The excavator shall ensure that the underground facilities of the utilities in the area of such excavation shall not be damaged or jeopardized.

In no event shall any excavation by blasting take place unless notice thereof, either in the initial notice or a subsequent notice accurately specifying the date and location of such blasting shall have been given and received at least 72 hours in advance, except in the case of an unanticipated obstruction requiring blasting when such notice shall be not less than four hours prior to such blasting. If any such notice cannot be given as aforesaid because of an emergency requiring blasting, it shall be given as soon as may be practicable but before any explosives are discharged.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40B** DESIGNATION OF LOCATION OF UNDERGROUND
FACILITIES

Section 40B. Within 72 hours, exclusive of Saturdays, Sundays and legal holidays, from the time the initial notice is received by the system or at such time as the company and the excavator agree, such company shall respond to the initial notice or subsequent notice by designating the location of the underground facilities within 15 feet in any direction of the premarking so that the existing facilities are to be found within a safety zone. Such safety zone shall be so designated by the use of standard color-coded markings. The providing of such designation by the company shall constitute prima facie evidence of an exercise of reasonable precaution by the company as required by this section; provided, however, that in the event that the excavator has given

notice as aforesaid at a location at which because of the length of excavation the company cannot reasonably designate the entire location of its facilities within such 72 hour period, then such excavator shall identify for the company that portion of the excavation which is to be first made and the company shall designate the location of its facilities in such portion within 72 hours and shall designate the location of its facilities in the remaining portion of the location within a reasonable time thereafter. When an emergency notification has been given to the system, the company shall make every attempt to designate its facilities as promptly as possible.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40C** EXCAVATOR'S RESPONSIBILITY TO MAINTAIN
DESIGNATION MARKINGS; DAMAGE CAUSED BY
EXCAVATOR

Section 40C. After a company has designated the location of its facilities at the location in accordance with section 40B, the excavator shall be responsible for maintaining the designation markings at such locations, unless such excavator requests remarking at the location due to the obliteration, destruction or other removal of such markings. The company shall then remark such location within 24 hours following receipt of such request.

When excavating in close proximity to the underground facilities of any company when such facilities are to be exposed, non-mechanical means shall be employed, as necessary, to avoid damage in locating such facility and any further excavation shall

be performed employing reasonable precautions to avoid damage to any underground facilities including, but not limited to, any substantial weakening of structural or lateral support of such facilities, penetration or destruction of any pipe, main, wire or conduit or the protective coating thereof, or damage to any pipe, main, wire or conduit.

If any damage to such pipe, main, wire or conduit or its protective coating occurs, the company shall be notified immediately by the excavator responsible for causing such damage.

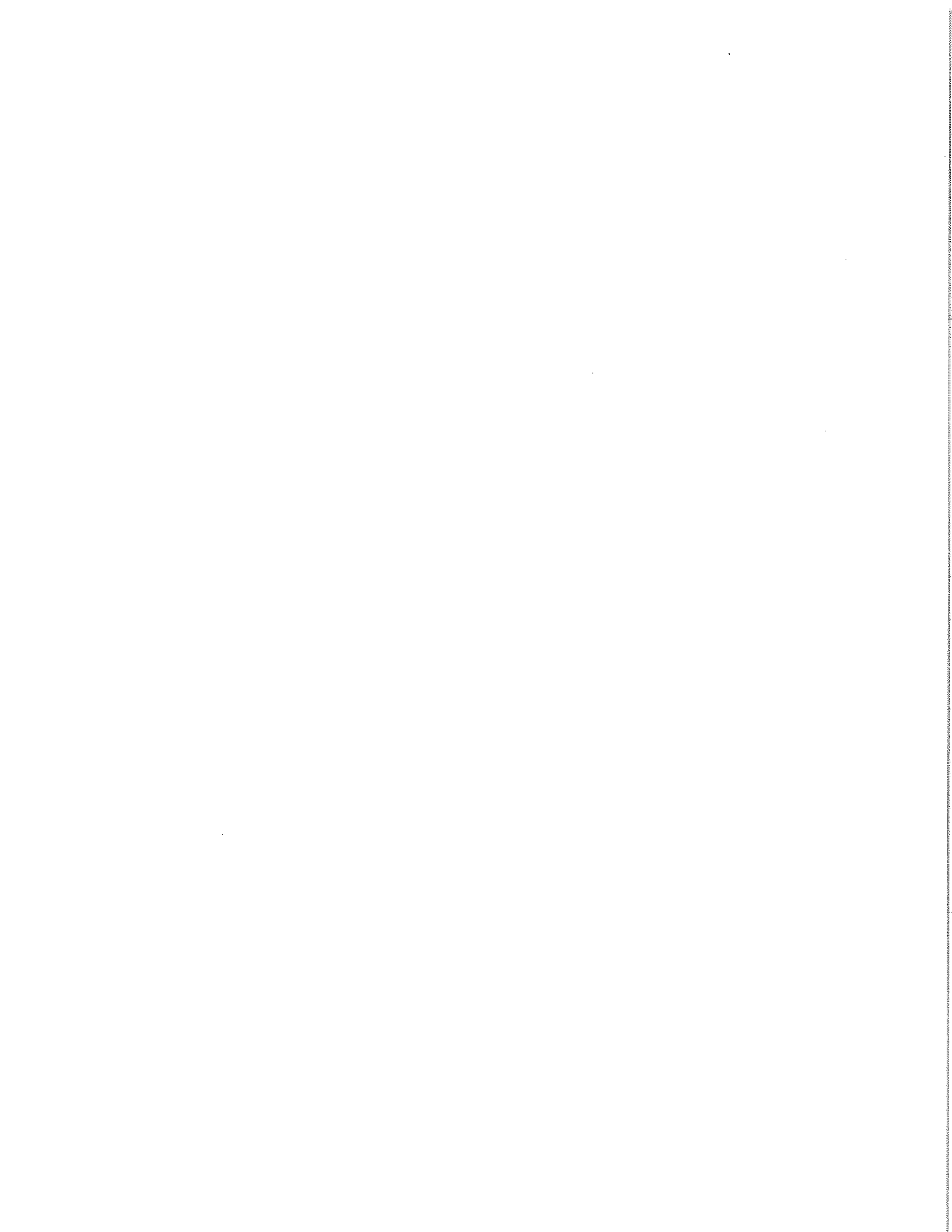
The making of an excavation without providing the notice required by section 40A with respect to any proposed excavation which results in any damage to a pipe, main, wire or conduit, or its protective coating, shall be prima facie evidence in any legal or administrative proceeding that such damage was caused by the negligence of such person.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40D** LOCAL LAWS REQUIRING EXCAVATION PERMITS;
PUBLIC WAYS

Section 40D. Nothing in this section shall affect or impair local ordinances or by-laws requiring a permit to be obtained before excavation in a public way or on private property; but notwithstanding any general or special law, ordinance or by-law to the contrary, to the extent that any permit issued under the provisions of the state building code or state fire code requires excavation by an excavator on a public way or on private property, the permit shall not be valid unless the excavator notifies the system as required pursuant to sections 40 and 40A, before the commencement of the excavation, and has complied with the permitting requirements of chapter 82A.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter 82** THE LAYING OUT, ALTERATION, RELOCATION AND
DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC
REPAIRS THEREON**Section 40E** VIOLATIONS OF SECS. 40A TO 40E; PUNISHMENT

Section 40E. Any person or company found by the department of telecommunications and energy, after a hearing, to have violated any provision of sections 40A to 40E, inclusive, shall be fined \$1,000 for the first offense and not less than \$5,000 nor more than \$10,000 for any subsequent offense within 12 consecutive months as set forth by the rules of said department; provided, however, that nothing herein shall be construed to require forfeiture of any penal sum by a state or local government body for violation of section 40A or 40C; and provided, further, that nothing herein shall be construed to require the forfeiture of any penal sum by a residential property owner for the failure to premark for an excavation on such person's residential property.



Part I ADMINISTRATION OF THE GOVERNMENT**Title XIV** PUBLIC WAYS AND WORKS**Chapter** EXCAVATION AND TRENCH SAFETY
82A**Section 1** UNATTENDED OPEN TRENCHES; SAFETY HAZARDS;
RULES AND REGULATIONS; FINES

Section 1. An excavator shall not leave an open trench unattended without first making reasonable effort to eliminate any recognized safety hazard that may exist as a result of leaving the open trench unattended. The commissioner of the division of professional licensure, in conjunction with the director of labor and workforce development, or his designee, shall promulgate rules and regulations governing all construction related excavations and trench safety. The rules and regulations shall include, but not be limited to, a description of recognized safety hazards that may exist as a result of leaving open trenches or excavations unattended, a description of the procedures required or recommended by the division of professional licensure to eliminate safety hazards which may include covering, barricading

or otherwise protecting open trenches from accidental entry, and a penalty structure for each violation of the proposed rules and regulations to be imposed by the agency empowered with ensuring compliance with the rules and regulations. This penalty structure shall include the imposition of a fine for each violation of the regulations promulgated pursuant to this section. Any such fines collected by the office of public safety and inspections of the division of professional licensure or the department of labor and workforce development shall be available for expenditure, without further appropriation, by those agencies in an amount not to exceed \$100,000 during each fiscal year for the sole purpose of providing construction safety training for licensed operators of hoisting equipment, police department officials, fire department officials and building officials. Those agencies may also charge a reasonable fee to help defray the costs associated with said training. Any monies collected from the imposition of these fines in excess of \$100,000 shall be transmitted monthly by those departments to the state treasurer who shall then deposit the excess funds into the General Fund. The office of public safety and inspections of the division of professional licensure, in conjunction with the department of labor and workforce development, shall file a report detailing the amount of fines imposed, collected and expended pursuant to this section with the house and senate committees on ways and means and with the joint committee on public safety not later than August 15 of each year. The rules and regulations shall not be effective until the

office of public safety and inspections of the division of professional licensure has received a formal determination from the United States Secretary of Labor that the proposed rules or regulations do not seek to assume responsibility for development and enforcement therein of occupational safety and health standards relating to any occupational safety or health issue with respect to which a federal standard has already been promulgated under 29 U.S.C. section 667 or until the rules and regulations are approved by the United States Secretary of Labor as a state plan for the development of the standards and their enforcement pursuant to 29 U.S.C. section 667(c).

Part I ADMINISTRATION OF THE GOVERNMENT**Title XXI** LABOR AND INDUSTRIES**Chapter 149** LABOR AND INDUSTRIES**Section 34** PUBLIC CONTRACTS; STIPULATION AS TO HOURS AND DAYS OF WORK; VOID CONTRACTS

Section 34. Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid; provided, that in contracts entered into by the department of highways for the construction or reconstruction of

highways there may be inserted in said stipulation a provision that said department, or any contractor or sub-contractor for said department, may employ laborers, workmen, mechanics, foremen and inspectors for more than eight hours in any one day in such construction or reconstruction when, in the opinion of the commissioner, public necessity so requires. Every such contract not containing the aforesaid stipulation shall be null and void.

Part I ADMINISTRATION OF THE GOVERNMENT**Title XXI** LABOR AND INDUSTRIES**Chapter 149** LABOR AND INDUSTRIES**Section 44J** INVITATIONS TO BID; NOTICE; CONTENTS; VIOLATIONS;
PENALTY

Section 44J. (1) No public agency or authority of the commonwealth or any political subdivision thereof shall award any contract for which competitive bids are required pursuant to section forty-four A of this chapter or section thirty-nine M of chapter thirty, or for which competitive proposals are required pursuant to subsection (4) of section forty-four E of this chapter or section eleven C of chapter twenty-five A, unless a notice inviting bids or proposals therefor shall have been posted no less than one week prior to the time specified in such notice for the receipt of said bids or proposals in a conspicuous place in or near the offices of the awarding authority, and shall have remained posted until the time so specified, and unless such notice shall also have been published at least once not less than two weeks prior to the time so specified in the central register published by the secretary of state pursuant to section twenty A of chapter nine and in a newspaper

of general circulation in the locality of the proposed project, and on the COMMBUYS system administered by the operational services division. Said notice shall also be published at such other times and in such other newspapers or trade periodicals as the commissioner of capital asset management and maintenance may require, having regard to the locality of the work involved.

(2) Said notice shall specify the time and place where plans and specifications of the proposed work may be had; the time and place of submission of general bids; and the time and place for opening of the general bids. For contracts subject to the provisions of sections forty-four A to H, inclusive, of this chapter, said notice shall also specify the time and place for submission of filed sub-bids, where required pursuant to section forty-four F; and the time and place for opening of said filed sub-bids.

Said notice shall also provide sufficient facts concerning the nature and scope of such project, the type and elements of construction, and such other information as will assist applicants in deciding to bid on such contract.

(3) No contract or preliminary plans and specifications shall be split or divided for the purpose of evading the provisions of this section.

(4) General bids and filed sub-bids for any contract subject to this section shall be in writing and shall be opened in public at the time and place specified in the posted or published notice, and after being so opened shall be open to public inspection.

(5) The provisions of this section shall not apply to any transaction between the commonwealth and any public service corporation.

(6) The provisions of this section may be waived in cases of extreme emergency involving the health and safety of the people and their property, upon the written approval of said commissioner. The written approval shall contain a description of the circumstances and the reasons for the commissioner's determination.

(7) Whoever violates any provision of this section shall be punished by a fine of not more than ten thousand dollars or by imprisonment in the state prison for not more than three years or in a jail or house of correction for not more than two and one-half years, or by both said fine and imprisonment; and in the event of final conviction, said person shall be incapable of holding any office of honor, trust or profit under the commonwealth or under any county, district or municipal agency.

Each and every person who shall cause or conspire to cause any contract or preliminary plans and specifications to be split or divided for the purpose of evading the provisions of this section shall forfeit and pay to the commonwealth, a political subdivision thereof or other awarding authority subject to this section, the sum of not more than five thousand dollars and, in addition, such person or persons shall pay, apportioned among them, double the amount of damages which the commonwealth or political

subdivision thereof or other awarding authority may have sustained by reason of the doing of such act, together with the costs of the action.

(8) If an awarding authority rejects all general bids or does not receive any general bids, and advertises for a second opening of general bids with the original filed sub-bids as set forth in subsection (1) of section forty-four E the notice for receipt of such general bids may be published in the central register and elsewhere as required not less than one week prior to the time specified for such second opening of general bids.

(9) No request for proposals or invitation for bids issued under sections 38A 1/2 to 38O, inclusive, of chapter 7, section 11C of chapter 25A, section 39M of chapter 30, this section and sections 44A to 44H, inclusive, shall be advertised if the awarding authority's cost estimate is greater than 1 year old.

APPENDIX H

PRICE ADJUSTMENTS FOR CERTAIN MATERIALS IN CONSTRUCTION PROJECTS MGL CHAPTER 30, SECTION 38A

On November 20, 2013, the Massachusetts Legislature passed a bill (Chapter 150 of the Acts of 2013) requiring that water and sewer projects bid under MGL Chapter 30 Section 39M include price adjustment clauses for **fuel** (both diesel and gasoline), **liquid asphalt** and **portland cement** contained in cast in place concrete for all projects that are advertised for bid after January 1, 2014.

The inclusion of these clauses in the construction contract is the responsibility of the awarding authority, and as such, MassDEP does not dictate what language should be used in the contract. MassDEP will, however, review the contracts to verify that price adjustment clauses have been included.

Awarding Authorities may find value from researching the *price adjustment* information on the Massachusetts Department of Transportation (MassDOT) website at <https://www.massdot.state.ma.us/highway/DoingBusinessWithUs/Construction/PriceAdjustments.aspx>. MassDOT requires the use of price adjustment clauses in all of its contracts, and since 2008 has been requiring cities and towns utilizing Chapter 90 road construction funds to also include price adjustment clauses. Because of this, many cities and towns may already have drafted appropriate price adjustment language. This language would be suitable for use in SRF funded contracts. The MassDOT website has extensive information on price adjustments and required contract language for MassDOT contracts.

Attached below is the new Chapter 30, Section 38A language and the contract language that MassDOT uses in its construction contracts. The MassDOT contract language is presented as a possible starting point for borrowers that have not drafted price adjustment clauses. The LGU should consult with their legal and contract staff as appropriate in developing the price adjustment clauses.

Chapter 150 of the Acts of 2013 **An Act Relative to Price Adjustment for Certain Materials in Construction Projects**

Whereas, the deferred operation of this act would tend to defeat its purpose, which is to establish forthwith certain price adjustments, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same as follows:

SECTION 1. Chapter 30 of the General Laws is hereby amended by inserting after section 38 the following section:-

Section 38A. Contracts for road and bridge projects awarded as a result of a proposal or invitation for bids under section 39M shall include a price adjustment clause for each of the following materials: fuel, both diesel and gasoline; asphalt; concrete; and steel. Contracts for water and sewer projects awarded as a result of a proposal or invitation for bids under said section 39M shall include a price adjustment clause for fuel, both diesel and gasoline; liquid asphalt; and

portland cement contained in cast-in-place concrete. A base price for each material shall be set by the awarding authority or agency and shall be included in the bid documents at the time the project is advertised. The awarding authority or agency shall also identify in the bid documents the price index to be used for each material. The price adjustment clause shall provide for a contract adjustment to be made on a monthly basis when the monthly cost change exceeds plus or minus 5 per cent.

SECTION 2. Section 1 shall apply to projects which are advertised for bid after January 1, 2014.

Approved, November 25, 2013.

MassDOT Price Adjustment Clauses

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH UNITS
Revised: 02/02/2009

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

The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price. It shall not include transportation or other charges. This Price Adjustment will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price detailed below.

Period Price

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

New Asphalt Period Price Method

The "New Asphalt Period Price Method" is for contracts bid after December 15, 2008 and will show the Period Price of liquid asphalt for each monthly period as determined by MassHighway using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. MassHighway will post this Period Price on this website within two (2) business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassHighway the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

Old Asphalt Period Price Method

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

New and Old Asphalt Period Price Methods

The paragraphs below apply to both the New and the Old Asphalt Period Price Methods. The Contract Price of the hot mix asphalt mixture will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

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

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department approved extension of time.

***** END OF DOCUMENT *****

DOCUMENT 00812
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE --
ENGLISH UNITS
Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (<http://www.massdot.state.ma.us/>) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

***** END OF DOCUMENT *****

DOCUMENT 00814
SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES
January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website <http://www.enr.com> under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01.

No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

END OF DOCUMENT

Commonwealth of Massachusetts Prevailing Wage Rates



CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

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

Prevailing Wage Rates

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

ROSALIN ACOSTA
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: City of Watertown
Contract Number: **City/Town:** WATERTOWN
Description of Work: Improvements to the Spray Park, including 15 multi zone spray features, and 2,500 square feet of non-porous rubber play surface.
Job Location: 195 Grove Street, Watertown, MA 02472

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

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

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

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2023

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

Effective Date - 01/01/2024

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

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) BRICKLAYERS LOCAL 3 (WALTHAM)	08/01/2022	\$59.15	\$11.49	\$22.34	\$0.00	\$92.98
	02/01/2023	\$60.35	\$11.49	\$22.34	\$0.00	\$94.18
	08/01/2023	\$62.40	\$11.49	\$22.34	\$0.00	\$96.23
	02/01/2024	\$63.65	\$11.49	\$22.34	\$0.00	\$97.48
	08/01/2024	\$65.75	\$11.49	\$22.34	\$0.00	\$99.58
	02/01/2025	\$67.05	\$11.49	\$22.34	\$0.00	\$100.88
	08/01/2025	\$69.20	\$11.49	\$22.34	\$0.00	\$103.03
	02/01/2026	\$70.55	\$11.49	\$22.34	\$0.00	\$104.38
	08/01/2026	\$72.75	\$11.49	\$22.34	\$0.00	\$106.58
	02/01/2027	\$74.15	\$11.49	\$22.34	\$0.00	\$107.98

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Waltham

Effective Date - 08/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.58	\$11.49	\$22.34	\$0.00	\$63.41
2	60	\$35.49	\$11.49	\$22.34	\$0.00	\$69.32
3	70	\$41.41	\$11.49	\$22.34	\$0.00	\$75.24
4	80	\$47.32	\$11.49	\$22.34	\$0.00	\$81.15
5	90	\$53.24	\$11.49	\$22.34	\$0.00	\$87.07

Effective Date - 02/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN	12/01/2021	\$42.33	\$9.10	\$17.72	\$0.00	\$69.15
LABORERS - FOUNDATION AND MARINE						
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
LABORERS - FOUNDATION AND MARINE						
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
LABORERS - FOUNDATION AND MARINE						
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
CARPENTER	09/01/2022	\$45.18	\$8.68	\$19.97	\$0.00	\$73.83
CARPENTERS -ZONE 2 (Eastern Massachusetts)	03/01/2023	\$45.78	\$8.68	\$19.97	\$0.00	\$74.43

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2022

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

Effective Date - 03/01/2023

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

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$31.01/ 3&4 \$48.64/ 5&6 \$57.24/ 7&8 \$63.54

Apprentice to Journeyworker Ratio:1:5

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

All Aspects of New Wood Frame Work

Apprentice - CARPENTER (Wood Frame) - Zone 2

Effective Date - 04/01/2022

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

Effective Date - 04/01/2023

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

Notes:

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

Step 1&2 \$20.09/ 3&4 \$24.95/ 5&6 \$33.04/ 7&8 \$35.91

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING	01/01/2023	\$49.45	\$12.75	\$22.74	\$0.87	\$85.81
BRICKLAYERS LOCAL 3 (WALTHAM)	07/01/2023	\$50.59	\$12.75	\$22.74	\$0.87	\$86.95
	01/01/2024	\$51.73	\$12.75	\$22.74	\$0.87	\$88.09

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Waltham)
Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.73	\$12.75	\$15.49	\$0.00	\$52.97
2	60	\$29.67	\$12.75	\$22.74	\$0.87	\$66.03
3	65	\$32.14	\$12.75	\$22.74	\$0.87	\$68.50
4	70	\$34.62	\$12.75	\$22.74	\$0.87	\$70.98
5	75	\$37.09	\$12.75	\$22.74	\$0.87	\$73.45
6	80	\$39.56	\$12.75	\$22.74	\$0.87	\$75.92
7	90	\$44.51	\$12.75	\$22.74	\$0.87	\$80.87

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.30	\$12.75	\$15.49	\$0.00	\$53.54
2	60	\$30.35	\$12.75	\$22.74	\$0.87	\$66.71
3	65	\$32.88	\$12.75	\$22.74	\$0.87	\$69.24
4	70	\$35.41	\$12.75	\$22.74	\$0.87	\$71.77
5	75	\$37.94	\$12.75	\$22.74	\$0.87	\$74.30
6	80	\$40.47	\$12.75	\$22.74	\$0.87	\$76.83
7	90	\$45.53	\$12.75	\$22.74	\$0.87	\$81.89

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	12/01/2022	\$54.68	\$14.25	\$16.05	\$0.00	\$84.98
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$55.95	\$14.25	\$16.05	\$0.00	\$86.25
	12/01/2023	\$57.23	\$14.25	\$16.05	\$0.00	\$87.53
	06/01/2024	\$58.55	\$14.25	\$16.05	\$0.00	\$88.85
	12/01/2024	\$60.03	\$14.25	\$16.05	\$0.00	\$90.33
	06/01/2025	\$61.36	\$14.25	\$16.05	\$0.00	\$91.66
	12/01/2025	\$62.83	\$14.25	\$16.05	\$0.00	\$93.13
	06/01/2026	\$64.16	\$14.25	\$16.05	\$0.00	\$94.46
	12/01/2026	\$65.64	\$14.25	\$16.05	\$0.00	\$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.76	\$13.00	\$20.86	\$0.00	\$92.62
	03/01/2023	\$60.43	\$13.00	\$20.91	\$0.00	\$94.34

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.50	\$13.00	\$0.71	\$0.00	\$37.21
2	40	\$23.50	\$13.00	\$0.71	\$0.00	\$37.21
3	45	\$26.44	\$13.00	\$15.64	\$0.00	\$55.08
4	45	\$26.44	\$13.00	\$15.64	\$0.00	\$55.08
5	50	\$29.38	\$13.00	\$16.12	\$0.00	\$58.50
6	55	\$32.32	\$13.00	\$16.60	\$0.00	\$61.92
7	60	\$35.26	\$13.00	\$17.07	\$0.00	\$65.33
8	65	\$38.19	\$13.00	\$17.55	\$0.00	\$68.74
9	70	\$41.13	\$13.00	\$18.01	\$0.00	\$72.14
10	75	\$44.07	\$13.00	\$18.49	\$0.00	\$75.56

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$24.17	\$13.00	\$0.73	\$0.00	\$37.90
2	40	\$24.17	\$13.00	\$0.73	\$0.00	\$37.90
3	45	\$27.19	\$13.00	\$15.67	\$0.00	\$55.86
4	45	\$27.19	\$13.00	\$15.67	\$0.00	\$55.86
5	50	\$30.22	\$13.00	\$16.15	\$0.00	\$59.37
6	55	\$33.24	\$13.00	\$16.63	\$0.00	\$62.87
7	60	\$36.26	\$13.00	\$17.10	\$0.00	\$66.36
8	65	\$39.28	\$13.00	\$17.58	\$0.00	\$69.86
9	70	\$42.30	\$13.00	\$18.05	\$0.00	\$73.35
10	75	\$45.32	\$13.00	\$18.53	\$0.00	\$76.85

Notes :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86
ELEVATOR CONSTRUCTORS LOCAL 4						

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - ELEVATOR CONSTRUCTOR - Local 4							
Effective Date - 01/01/2022							
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$32.81	\$16.03	\$0.00	\$0.00	\$48.84	
2	55	\$36.09	\$16.03	\$20.21	\$0.00	\$72.33	
3	65	\$42.65	\$16.03	\$20.21	\$0.00	\$78.89	
4	70	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17	
5	80	\$52.50	\$16.03	\$20.21	\$0.00	\$88.74	
<div><div>Notes:</div><div>Steps 1-2 are 6 mos.; Steps 3-5 are 1 year</div></div>							
Apprentice to Journeyworker Ratio:1:1							
ELEVATOR CONSTRUCTOR HELPER		01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
ELEVATOR CONSTRUCTORS LOCAL 4							
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)		12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
LABORERS - ZONE 1 (HEAVY & HIGHWAY)		06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
		12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
		06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
		12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
		06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
		12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
		06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
		12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY		11/05/2022	\$48.67	\$14.25	\$16.05	\$0.00	\$78.97
OPERATING ENGINEERS LOCAL 4		05/01/2023	\$49.91	\$14.25	\$16.05	\$0.00	\$80.21
		11/01/2023	\$51.15	\$14.25	\$16.05	\$0.00	\$81.45
		05/01/2024	\$52.39	\$14.25	\$16.05	\$0.00	\$82.69
		11/01/2024	\$53.68	\$14.25	\$16.05	\$0.00	\$83.98
		05/01/2025	\$55.12	\$14.25	\$16.05	\$0.00	\$85.42
		11/01/2025	\$56.41	\$14.25	\$16.05	\$0.00	\$86.71
		05/01/2026	\$57.85	\$14.25	\$16.05	\$0.00	\$88.15
		11/01/2026	\$59.14	\$14.25	\$16.05	\$0.00	\$89.44
		05/01/2027	\$60.57	\$14.25	\$16.05	\$0.00	\$90.87
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$50.22	\$14.25	\$16.05	\$0.00	\$80.52
	05/01/2023	\$51.47	\$14.25	\$16.05	\$0.00	\$81.77
	11/01/2023	\$52.72	\$14.25	\$16.05	\$0.00	\$83.02
	05/01/2024	\$53.97	\$14.25	\$16.05	\$0.00	\$84.27
	11/01/2024	\$55.27	\$14.25	\$16.05	\$0.00	\$85.57
	05/01/2025	\$56.72	\$14.25	\$16.05	\$0.00	\$87.02
	11/01/2025	\$58.02	\$14.25	\$16.05	\$0.00	\$88.32
	05/01/2026	\$59.47	\$14.25	\$16.05	\$0.00	\$89.77
	11/01/2026	\$60.77	\$14.25	\$16.05	\$0.00	\$91.07
	05/01/2027	\$62.22	\$14.25	\$16.05	\$0.00	\$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$24.31	\$14.25	\$16.05	\$0.00	\$54.61
	05/01/2023	\$25.05	\$14.25	\$16.05	\$0.00	\$55.35
	11/01/2023	\$25.78	\$14.25	\$16.05	\$0.00	\$56.08
	05/01/2024	\$26.51	\$14.25	\$16.05	\$0.00	\$56.81
	11/01/2024	\$27.27	\$14.25	\$16.05	\$0.00	\$57.57
	05/01/2025	\$28.12	\$14.25	\$16.05	\$0.00	\$58.42
	11/01/2025	\$28.88	\$14.25	\$16.05	\$0.00	\$59.18
	05/01/2026	\$29.73	\$14.25	\$16.05	\$0.00	\$60.03
	11/01/2026	\$30.49	\$14.25	\$16.05	\$0.00	\$60.79
	05/01/2027	\$31.34	\$14.25	\$16.05	\$0.00	\$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.76	\$13.00	\$20.86	\$0.00	\$92.62
	03/01/2023	\$60.43	\$13.00	\$20.91	\$0.00	\$94.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS</i> <i>LOCAL 103</i>	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$43.54	\$14.25	\$16.05	\$0.00	\$73.84
	06/01/2023	\$44.56	\$14.25	\$16.05	\$0.00	\$74.86
	12/01/2023	\$45.57	\$14.25	\$16.05	\$0.00	\$75.87
	06/01/2024	\$46.63	\$14.25	\$16.05	\$0.00	\$76.93
	12/01/2024	\$47.81	\$14.25	\$16.05	\$0.00	\$78.11
	06/01/2025	\$48.87	\$14.25	\$16.05	\$0.00	\$79.17
	12/01/2025	\$50.04	\$14.25	\$16.05	\$0.00	\$80.34
	06/01/2026	\$51.10	\$14.25	\$16.05	\$0.00	\$81.40
	12/01/2026	\$52.28	\$14.25	\$16.05	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$25.23	\$9.35	\$17.82	\$0.00	\$52.40
	06/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	12/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	06/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	12/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	06/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	12/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	06/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38
	12/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE I</i>	03/01/2022	\$49.93	\$8.68	\$20.27	\$0.00	\$78.88
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Apprentice - FLOORCOVERER - Local 2168 Zone I

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.97	\$8.68	\$1.79	\$0.00	\$35.44
2	55	\$27.46	\$8.68	\$1.79	\$0.00	\$37.93
3	60	\$29.96	\$8.68	\$14.90	\$0.00	\$53.54
4	65	\$32.45	\$8.68	\$14.90	\$0.00	\$56.03
5	70	\$34.95	\$8.68	\$16.69	\$0.00	\$60.32
6	75	\$37.45	\$8.68	\$16.69	\$0.00	\$62.82
7	80	\$39.94	\$8.68	\$18.48	\$0.00	\$67.10
8	85	\$42.44	\$8.68	\$18.48	\$0.00	\$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 \$32.94/ 3&4 \$39.66/ 5&6 \$60.32/ 7&8 \$67.10

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$8.65	\$0.00	\$0.00	\$32.03
2	55	\$25.72	\$8.65	\$6.27	\$0.00	\$40.64
3	60	\$28.06	\$8.65	\$6.84	\$0.00	\$43.55
4	65	\$30.39	\$8.65	\$7.41	\$0.00	\$46.45
5	70	\$32.73	\$8.65	\$19.63	\$0.00	\$61.01
6	75	\$35.07	\$8.65	\$20.20	\$0.00	\$63.92
7	80	\$37.41	\$8.65	\$20.77	\$0.00	\$66.83
8	90	\$42.08	\$8.65	\$21.91	\$0.00	\$72.64

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$29.50	\$14.25	\$0.00	\$0.00	\$43.75
2	60	\$32.18	\$14.25	\$16.05	\$0.00	\$62.48
3	65	\$34.86	\$14.25	\$16.05	\$0.00	\$65.16
4	70	\$37.54	\$14.25	\$16.05	\$0.00	\$67.84
5	75	\$40.22	\$14.25	\$16.05	\$0.00	\$70.52
6	80	\$42.90	\$14.25	\$16.05	\$0.00	\$73.20
7	85	\$45.59	\$14.25	\$16.05	\$0.00	\$75.89
8	90	\$48.27	\$14.25	\$16.05	\$0.00	\$78.57

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.18	\$14.25	\$0.00	\$0.00	\$44.43
2	60	\$32.93	\$14.25	\$16.05	\$0.00	\$63.23
3	65	\$35.67	\$14.25	\$16.05	\$0.00	\$65.97
4	70	\$38.42	\$14.25	\$16.05	\$0.00	\$68.72
5	75	\$41.16	\$14.25	\$16.05	\$0.00	\$71.46
6	80	\$43.90	\$14.25	\$16.05	\$0.00	\$74.20
7	85	\$46.65	\$14.25	\$16.05	\$0.00	\$76.95
8	90	\$49.39	\$14.25	\$16.05	\$0.00	\$79.69

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	08/01/2022	\$53.66	\$14.11	\$26.64	\$2.83	\$97.24
	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

For apprentice rates see "Apprentice- SHEET METAL WORKER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (ELECTRICAL CONTROLS) <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.76	\$13.00	\$20.86	\$0.00	\$92.62
For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2023	\$60.43	\$13.00	\$20.91	\$0.00	\$94.34
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	08/01/2022	\$53.66	\$14.11	\$26.64	\$2.83	\$97.24
	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
	06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
	12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
	06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
	12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
	06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
	12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
	06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
	12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
	06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
	12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2022	\$53.85	\$13.80	\$17.14	\$0.00	\$84.79

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.93	\$13.80	\$12.42	\$0.00	\$53.15
2	60	\$32.31	\$13.80	\$13.36	\$0.00	\$59.47
3	70	\$37.70	\$13.80	\$14.31	\$0.00	\$65.81
4	80	\$43.08	\$13.80	\$15.25	\$0.00	\$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (BOSTON AREA)</i>	09/16/2022	\$51.59	\$8.25	\$26.70	\$0.00	\$86.54

Apprentice - IRONWORKER - Local 7 Boston

Effective Date - 09/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$30.95	\$8.25	\$26.70	\$0.00	\$65.90
2	70	\$36.11	\$8.25	\$26.70	\$0.00	\$71.06
3	75	\$38.69	\$8.25	\$26.70	\$0.00	\$73.64
4	80	\$41.27	\$8.25	\$26.70	\$0.00	\$76.22
5	85	\$43.85	\$8.25	\$26.70	\$0.00	\$78.80
6	90	\$46.43	\$8.25	\$26.70	\$0.00	\$81.38

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10

Apprentice - LABORER - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.91	\$9.10	\$17.57	\$0.00	\$52.58
2	70	\$30.23	\$9.10	\$17.57	\$0.00	\$56.90
3	80	\$34.54	\$9.10	\$17.57	\$0.00	\$61.21
4	90	\$38.86	\$9.10	\$17.57	\$0.00	\$65.53

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.51	\$9.10	\$17.57	\$0.00	\$53.18
2	70	\$30.93	\$9.10	\$17.57	\$0.00	\$57.60
3	80	\$35.34	\$9.10	\$17.57	\$0.00	\$62.01
4	90	\$39.76	\$9.10	\$17.57	\$0.00	\$66.43

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00

Apprentice - LABORER (Heavy & Highway) - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.55	\$9.35	\$17.82	\$0.00	\$52.72
2	70	\$29.81	\$9.35	\$17.82	\$0.00	\$56.98
3	80	\$34.06	\$9.35	\$17.82	\$0.00	\$61.23
4	90	\$38.32	\$9.35	\$17.82	\$0.00	\$65.49

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.15	\$9.35	\$17.82	\$0.00	\$53.32
2	70	\$30.51	\$9.35	\$17.82	\$0.00	\$57.68
3	80	\$34.86	\$9.35	\$17.82	\$0.00	\$62.03
4	90	\$39.22	\$9.35	\$17.82	\$0.00	\$66.39

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
LABORERS - ZONE 1	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
LABORERS - ZONE 1	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
LABORERS - ZONE 1	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	06/01/2024	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2022	\$45.29	\$11.49	\$20.37	\$0.00	\$77.15
	02/01/2023	\$46.25	\$11.49	\$20.37	\$0.00	\$78.11
	08/01/2023	\$47.89	\$11.49	\$20.37	\$0.00	\$79.75
	02/01/2024	\$48.89	\$11.49	\$20.37	\$0.00	\$80.75
	08/01/2024	\$50.57	\$11.49	\$20.37	\$0.00	\$82.43
	02/01/2025	\$51.61	\$11.49	\$20.37	\$0.00	\$83.47
	08/01/2025	\$53.33	\$11.49	\$20.37	\$0.00	\$85.19
	02/01/2026	\$54.41	\$11.49	\$20.37	\$0.00	\$86.27
	08/01/2026	\$56.17	\$11.49	\$20.37	\$0.00	\$88.03
	02/01/2027	\$57.29	\$11.49	\$20.37	\$0.00	\$89.15

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.65	\$11.49	\$20.37	\$0.00	\$54.51
2	60	\$27.17	\$11.49	\$20.37	\$0.00	\$59.03
3	70	\$31.70	\$11.49	\$20.37	\$0.00	\$63.56
4	80	\$36.23	\$11.49	\$20.37	\$0.00	\$68.09
5	90	\$40.76	\$11.49	\$20.37	\$0.00	\$72.62

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.13	\$11.49	\$20.37	\$0.00	\$54.99
2	60	\$27.75	\$11.49	\$20.37	\$0.00	\$59.61
3	70	\$32.38	\$11.49	\$20.37	\$0.00	\$64.24
4	80	\$37.00	\$11.49	\$20.37	\$0.00	\$68.86
5	90	\$41.63	\$11.49	\$20.37	\$0.00	\$73.49

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH	08/01/2022	\$59.17	\$11.49	\$22.31	\$0.00	\$92.97
BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2023	\$60.37	\$11.49	\$22.31	\$0.00	\$94.17
	08/01/2023	\$62.42	\$11.49	\$22.31	\$0.00	\$96.22
	02/01/2024	\$63.67	\$11.49	\$22.31	\$0.00	\$97.47
	08/01/2024	\$65.77	\$11.49	\$22.31	\$0.00	\$99.57
	02/01/2025	\$67.07	\$11.49	\$22.31	\$0.00	\$100.87
	08/01/2025	\$69.22	\$11.49	\$22.31	\$0.00	\$103.02
	02/01/2026	\$70.57	\$11.49	\$22.31	\$0.00	\$104.37
	08/01/2026	\$72.77	\$11.49	\$22.31	\$0.00	\$106.57
	02/01/2027	\$74.17	\$11.49	\$22.31	\$0.00	\$107.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 08/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.59	\$11.49	\$22.31	\$0.00	\$63.39
2	60	\$35.50	\$11.49	\$22.31	\$0.00	\$69.30
3	70	\$41.42	\$11.49	\$22.31	\$0.00	\$75.22
4	80	\$47.34	\$11.49	\$22.31	\$0.00	\$81.14
5	90	\$53.25	\$11.49	\$22.31	\$0.00	\$87.05

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.19	\$11.49	\$22.31	\$0.00	\$63.99
2	60	\$36.22	\$11.49	\$22.31	\$0.00	\$70.02
3	70	\$42.26	\$11.49	\$22.31	\$0.00	\$76.06
4	80	\$48.30	\$11.49	\$22.31	\$0.00	\$82.10
5	90	\$54.33	\$11.49	\$22.31	\$0.00	\$88.13

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 1)	01/02/2023	\$47.27	\$8.58	\$21.57	\$0.00	\$77.42
MILLWRIGHTS LOCAL 1121 - Zone 1						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - MILLWRIGHT - Local 1121 Zone 1						
Effective Date - 01/02/2023						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$26.00	\$8.58	\$5.72	\$0.00	\$40.30
2	65	\$30.73	\$8.58	\$17.93	\$0.00	\$57.24
3	75	\$35.45	\$8.58	\$18.98	\$0.00	\$63.01
4	85	\$40.18	\$8.58	\$20.01	\$0.00	\$68.77
Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66) Steps are 2,000 hours						
Apprentice to Journeyworker Ratio:1:4						
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MORTAR MIXER	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
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OILER (OTHER THAN TRUCK CRANES,GRADALLS)	12/01/2022	\$24.37	\$14.25	\$16.05	\$0.00	\$54.67
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$24.94	\$14.25	\$16.05	\$0.00	\$55.24
	12/01/2023	\$25.51	\$14.25	\$16.05	\$0.00	\$55.81
	06/01/2024	\$26.11	\$14.25	\$16.05	\$0.00	\$56.41
	12/01/2024	\$26.77	\$14.25	\$16.05	\$0.00	\$57.07
	06/01/2025	\$27.37	\$14.25	\$16.05	\$0.00	\$57.67
	12/01/2025	\$28.03	\$14.25	\$16.05	\$0.00	\$58.33
	06/01/2026	\$28.62	\$14.25	\$16.05	\$0.00	\$58.92
	12/01/2026	\$29.29	\$14.25	\$16.05	\$0.00	\$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
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OILER (TRUCK CRANES, GRADALLS)	12/01/2022	\$29.57	\$14.25	\$16.05	\$0.00	\$59.87
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$30.27	\$14.25	\$16.05	\$0.00	\$60.57
	12/01/2023	\$30.96	\$14.25	\$16.05	\$0.00	\$61.26
	06/01/2024	\$31.68	\$14.25	\$16.05	\$0.00	\$61.98
	12/01/2024	\$32.48	\$14.25	\$16.05	\$0.00	\$62.78
	06/01/2025	\$33.20	\$14.25	\$16.05	\$0.00	\$63.50
	12/01/2025	\$34.00	\$14.25	\$16.05	\$0.00	\$64.30
	06/01/2026	\$34.72	\$14.25	\$16.05	\$0.00	\$65.02
	12/01/2026	\$35.52	\$14.25	\$16.05	\$0.00	\$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
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OTHER POWER DRIVEN EQUIPMENT - CLASS II	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS)	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2023	\$46.96	\$8.65	\$23.05	\$0.00	\$78.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$48.16	\$8.65	\$23.05	\$0.00	\$79.86
	01/01/2024	\$49.36	\$8.65	\$23.05	\$0.00	\$81.06
	07/01/2024	\$50.56	\$8.65	\$23.05	\$0.00	\$82.26
	01/01/2025	\$51.76	\$8.65	\$23.05	\$0.00	\$83.46

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.48	\$8.65	\$0.00	\$0.00	\$32.13
2	55	\$25.83	\$8.65	\$6.27	\$0.00	\$40.75
3	60	\$28.18	\$8.65	\$6.84	\$0.00	\$43.67
4	65	\$30.52	\$8.65	\$7.41	\$0.00	\$46.58
5	70	\$32.87	\$8.65	\$19.63	\$0.00	\$61.15
6	75	\$35.22	\$8.65	\$20.20	\$0.00	\$64.07
7	80	\$37.57	\$8.65	\$20.77	\$0.00	\$66.99
8	90	\$42.26	\$8.65	\$21.91	\$0.00	\$72.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$8.65	\$0.00	\$0.00	\$32.73
2	55	\$26.49	\$8.65	\$6.27	\$0.00	\$41.41
3	60	\$28.90	\$8.65	\$6.84	\$0.00	\$44.39
4	65	\$31.30	\$8.65	\$7.41	\$0.00	\$47.36
5	70	\$33.71	\$8.65	\$19.63	\$0.00	\$61.99
6	75	\$36.12	\$8.65	\$20.20	\$0.00	\$64.97
7	80	\$38.53	\$8.65	\$20.77	\$0.00	\$67.95
8	90	\$43.34	\$8.65	\$21.91	\$0.00	\$73.90

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2023	\$45.02	\$8.65	\$23.05	\$0.00	\$76.72
PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$46.22	\$8.65	\$23.05	\$0.00	\$77.92
	01/01/2024	\$47.42	\$8.65	\$23.05	\$0.00	\$79.12
	07/01/2024	\$48.62	\$8.65	\$23.05	\$0.00	\$80.32
	01/01/2025	\$49.82	\$8.65	\$23.05	\$0.00	\$81.52

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint**Effective Date - 01/01/2023**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.51	\$8.65	\$0.00	\$0.00	\$31.16
2	55	\$24.76	\$8.65	\$6.27	\$0.00	\$39.68
3	60	\$27.01	\$8.65	\$6.84	\$0.00	\$42.50
4	65	\$29.26	\$8.65	\$7.41	\$0.00	\$45.32
5	70	\$31.51	\$8.65	\$19.63	\$0.00	\$59.79
6	75	\$33.77	\$8.65	\$20.20	\$0.00	\$62.62
7	80	\$36.02	\$8.65	\$20.77	\$0.00	\$65.44
8	90	\$40.52	\$8.65	\$21.91	\$0.00	\$71.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$8.65	\$0.00	\$0.00	\$31.76
2	55	\$25.42	\$8.65	\$6.27	\$0.00	\$40.34
3	60	\$27.73	\$8.65	\$6.84	\$0.00	\$43.22
4	65	\$30.04	\$8.65	\$19.06	\$0.00	\$57.75
5	70	\$32.35	\$8.65	\$19.63	\$0.00	\$60.63
6	75	\$34.67	\$8.65	\$20.20	\$0.00	\$63.52
7	80	\$36.98	\$8.65	\$20.77	\$0.00	\$66.40
8	90	\$41.60	\$8.65	\$21.91	\$0.00	\$72.16

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used. *PAINTERS LOCAL 35 - ZONE 2*

01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$8.65	\$0.00	\$0.00	\$32.03
2	55	\$25.72	\$8.65	\$6.27	\$0.00	\$40.64
3	60	\$28.06	\$8.65	\$6.84	\$0.00	\$43.55
4	65	\$30.39	\$8.65	\$7.41	\$0.00	\$46.45
5	70	\$32.73	\$8.65	\$19.63	\$0.00	\$61.01
6	75	\$35.07	\$8.65	\$20.20	\$0.00	\$63.92
7	80	\$37.41	\$8.65	\$20.77	\$0.00	\$66.83
8	90	\$42.08	\$8.65	\$21.91	\$0.00	\$72.64

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2023	\$43.62	\$8.65	\$23.05	\$0.00	\$75.32
PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$44.82	\$8.65	\$23.05	\$0.00	\$76.52
	01/01/2024	\$46.02	\$8.65	\$23.05	\$0.00	\$77.72
	07/01/2024	\$47.22	\$8.65	\$23.05	\$0.00	\$78.92
	01/01/2025	\$48.42	\$8.65	\$23.05	\$0.00	\$80.12

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.81	\$8.65	\$0.00	\$0.00	\$30.46
2	55	\$23.99	\$8.65	\$6.27	\$0.00	\$38.91
3	60	\$26.17	\$8.65	\$6.84	\$0.00	\$41.66
4	65	\$28.35	\$8.65	\$7.41	\$0.00	\$44.41
5	70	\$30.53	\$8.65	\$19.63	\$0.00	\$58.81
6	75	\$32.72	\$8.65	\$20.20	\$0.00	\$61.57
7	80	\$34.90	\$8.65	\$20.77	\$0.00	\$64.32
8	90	\$39.26	\$8.65	\$21.91	\$0.00	\$69.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.41	\$8.65	\$0.00	\$0.00	\$31.06
2	55	\$24.65	\$8.65	\$6.27	\$0.00	\$39.57
3	60	\$26.89	\$8.65	\$6.84	\$0.00	\$42.38
4	65	\$29.13	\$8.65	\$7.41	\$0.00	\$45.19
5	70	\$31.37	\$8.65	\$19.63	\$0.00	\$59.65
6	75	\$33.62	\$8.65	\$20.20	\$0.00	\$62.47
7	80	\$35.86	\$8.65	\$20.77	\$0.00	\$65.28
8	90	\$40.34	\$8.65	\$21.91	\$0.00	\$70.90

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER	12/01/2021	\$36.88	\$13.41	\$16.01	\$0.00	\$66.30
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A						
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$9.40	\$23.12	\$0.00	\$57.06
2	60	\$29.44	\$9.40	\$23.12	\$0.00	\$61.96
3	70	\$34.35	\$9.40	\$23.12	\$0.00	\$66.87
4	75	\$36.80	\$9.40	\$23.12	\$0.00	\$69.32
5	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
6	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
7	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68
8	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$34.01/ 3&4 \$41.46/ 5&6 \$62.80/ 7&8 \$69.25

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
PIPEFITTERS LOCAL 537						

Apprentice - PIPEFITTER - Local 537

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.18	\$11.70	\$8.25	\$0.00	\$43.13
2	45	\$26.07	\$11.70	\$20.24	\$0.00	\$58.01
3	60	\$34.76	\$11.70	\$20.24	\$0.00	\$66.70
4	70	\$40.56	\$11.70	\$20.24	\$0.00	\$72.50
5	80	\$46.35	\$11.70	\$20.24	\$0.00	\$78.29

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1						
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
LABORERS - ZONE 1 (HEAVY & HIGHWAY)						
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PLUMBERS & GASFITTERS	09/04/2022	\$63.49	\$14.07	\$18.36	\$0.00	\$95.92
PLUMBERS & GASFITTERS LOCAL 12	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77

Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.22	\$14.07	\$6.63	\$0.00	\$42.92
2	40	\$25.40	\$14.07	\$7.52	\$0.00	\$46.99
3	55	\$34.92	\$14.07	\$10.24	\$0.00	\$59.23
4	65	\$41.27	\$14.07	\$12.04	\$0.00	\$67.38
5	75	\$47.62	\$14.07	\$13.85	\$0.00	\$75.54

Effective Date - 02/26/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.82	\$14.07	\$6.63	\$0.00	\$43.52
2	40	\$26.08	\$14.07	\$7.52	\$0.00	\$47.67
3	55	\$35.85	\$14.07	\$10.24	\$0.00	\$60.16
4	65	\$42.37	\$14.07	\$12.04	\$0.00	\$68.48
5	75	\$48.89	\$14.07	\$13.85	\$0.00	\$76.81

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic\$69.00, Step5 with lic\$76.87

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.)	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
PIPEFITTERS LOCAL 537						

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

PNEUMATIC DRILL/TOOL OPERATOR	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
LABORERS - ZONE 1	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	06/01/2023	\$45.18	\$9.10	\$17.57	\$0.00	\$71.85
	12/01/2023	\$46.43	\$9.10	\$17.57	\$0.00	\$73.10
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	06/01/2023	\$44.58	\$9.35	\$17.82	\$0.00	\$71.75
	12/01/2023	\$45.83	\$9.35	\$17.82	\$0.00	\$73.00
	06/01/2024	\$47.31	\$9.35	\$17.82	\$0.00	\$74.48
	12/01/2024	\$48.78	\$9.35	\$17.82	\$0.00	\$75.95
	06/01/2025	\$50.28	\$9.35	\$17.82	\$0.00	\$77.45
	12/01/2025	\$51.78	\$9.35	\$17.82	\$0.00	\$78.95
	06/01/2026	\$53.33	\$9.35	\$17.82	\$0.00	\$80.50
	12/01/2026	\$54.83	\$9.35	\$17.82	\$0.00	\$82.00
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY MIX CONCRETE DRIVERS after 4/30/12 (Drivers Hired After 4/30/2012) <i>TEAMSTERS 25 (Suburban) - Aggregate</i>	08/01/2022	\$30.40	\$11.91	\$15.25	\$0.00	\$57.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 25 (Suburban) - Aggregate</i>	08/01/2022	\$30.50	\$11.91	\$15.25	\$0.00	\$57.66
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE I</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Dampproofing) <i>ROOFERS LOCAL 33</i>	08/01/2022	\$48.53	\$12.28	\$19.45	\$0.00	\$80.26
	02/01/2023	\$49.78	\$12.28	\$19.45	\$0.00	\$81.51
	08/01/2023	\$51.28	\$12.28	\$19.45	\$0.00	\$83.01
	02/01/2024	\$52.53	\$12.28	\$19.45	\$0.00	\$84.26
	08/01/2024	\$54.03	\$12.28	\$19.45	\$0.00	\$85.76
	02/01/2025	\$55.28	\$12.28	\$19.45	\$0.00	\$87.01
	08/01/2025	\$56.78	\$12.28	\$19.45	\$0.00	\$88.51
	02/01/2026	\$58.03	\$12.28	\$19.45	\$0.00	\$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - ROOFER - Local 33

Effective Date - 08/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.27	\$12.28	\$5.21	\$0.00	\$41.76
2	60	\$29.12	\$12.28	\$19.45	\$0.00	\$60.85
3	65	\$31.54	\$12.28	\$19.45	\$0.00	\$63.27
4	75	\$36.40	\$12.28	\$19.45	\$0.00	\$68.13
5	85	\$41.25	\$12.28	\$19.45	\$0.00	\$72.98

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.89	\$12.28	\$5.21	\$0.00	\$42.38
2	60	\$29.87	\$12.28	\$19.45	\$0.00	\$61.60
3	65	\$32.36	\$12.28	\$19.45	\$0.00	\$64.09
4	75	\$37.34	\$12.28	\$19.45	\$0.00	\$69.07
5	85	\$42.31	\$12.28	\$19.45	\$0.00	\$74.04

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE	08/01/2022	\$48.78	\$12.28	\$19.45	\$0.00	\$80.51
ROOFERS LOCAL 33	02/01/2023	\$50.03	\$12.28	\$19.45	\$0.00	\$81.76
	08/01/2023	\$51.53	\$12.28	\$19.45	\$0.00	\$83.26
	02/01/2024	\$52.78	\$12.28	\$19.45	\$0.00	\$84.51
	08/01/2024	\$54.28	\$12.28	\$19.45	\$0.00	\$86.01
	02/01/2025	\$55.53	\$12.28	\$19.45	\$0.00	\$87.26
	08/01/2025	\$57.03	\$12.28	\$19.45	\$0.00	\$88.76
	02/01/2026	\$58.28	\$12.28	\$19.45	\$0.00	\$90.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	08/01/2022	\$53.66	\$14.11	\$26.64	\$2.83	\$97.24
SHEETMETAL WORKERS LOCAL 17 - A	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

Apprentice - SHEET METAL WORKER - Local 17-A**Effective Date - 08/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$22.54	\$14.11	\$6.13	\$0.00	\$42.78
2	42	\$22.54	\$14.11	\$6.13	\$0.00	\$42.78
3	47	\$25.22	\$14.11	\$11.90	\$1.54	\$52.77
4	47	\$25.22	\$14.11	\$11.90	\$1.54	\$52.77
5	52	\$27.90	\$14.11	\$12.88	\$1.65	\$56.54
6	52	\$27.90	\$14.11	\$13.13	\$1.65	\$56.79
7	60	\$32.20	\$14.11	\$14.54	\$1.83	\$62.68
8	65	\$34.88	\$14.11	\$15.52	\$1.94	\$66.45
9	75	\$40.25	\$14.11	\$17.48	\$2.16	\$74.00
10	85	\$45.61	\$14.11	\$18.94	\$2.36	\$81.02

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
2	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
3	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
4	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
5	52	\$28.76	\$14.11	\$12.88	\$1.65	\$57.40
6	52	\$28.76	\$14.11	\$13.13	\$1.65	\$57.65
7	60	\$33.19	\$14.11	\$14.54	\$1.83	\$63.67
8	65	\$35.95	\$14.11	\$15.52	\$1.94	\$67.52
9	75	\$41.48	\$14.11	\$17.48	\$2.16	\$75.23
10	85	\$47.01	\$14.11	\$18.94	\$2.36	\$82.42

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2021	\$37.63	\$13.41	\$16.01	\$0.00	\$67.05
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1	10/01/2022	\$65.56	\$15.50	\$22.10	\$0.00	\$103.16
	03/01/2023	\$67.26	\$15.50	\$22.10	\$0.00	\$104.86
	10/01/2023	\$69.01	\$15.50	\$22.10	\$0.00	\$106.61
	03/01/2024	\$70.81	\$15.50	\$22.10	\$0.00	\$108.41
	10/01/2024	\$72.61	\$15.50	\$22.10	\$0.00	\$110.21
	03/01/2025	\$74.41	\$15.50	\$22.10	\$0.00	\$112.01

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1
Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.95	\$15.50	\$9.60	\$0.00	\$48.05
2	40	\$26.22	\$15.50	\$9.60	\$0.00	\$51.32
3	45	\$29.50	\$15.50	\$9.60	\$0.00	\$54.60
4	50	\$32.78	\$15.50	\$9.60	\$0.00	\$57.88
5	55	\$36.06	\$15.50	\$9.60	\$0.00	\$61.16
6	60	\$39.34	\$15.50	\$11.10	\$0.00	\$65.94
7	65	\$42.61	\$15.50	\$11.10	\$0.00	\$69.21
8	70	\$45.89	\$15.50	\$11.10	\$0.00	\$72.49
9	75	\$49.17	\$15.50	\$11.10	\$0.00	\$75.77
10	80	\$52.45	\$15.50	\$11.10	\$0.00	\$79.05

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.54	\$15.50	\$9.60	\$0.00	\$48.64
2	40	\$26.90	\$15.50	\$9.60	\$0.00	\$52.00
3	45	\$30.27	\$15.50	\$9.60	\$0.00	\$55.37
4	50	\$33.63	\$15.50	\$9.60	\$0.00	\$58.73
5	55	\$36.99	\$15.50	\$9.60	\$0.00	\$62.09
6	60	\$40.36	\$15.50	\$11.10	\$0.00	\$66.96
7	65	\$43.72	\$15.50	\$11.10	\$0.00	\$70.32
8	70	\$47.08	\$15.50	\$11.10	\$0.00	\$73.68
9	75	\$50.45	\$15.50	\$11.10	\$0.00	\$77.05
10	80	\$53.81	\$15.50	\$11.10	\$0.00	\$80.41

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

Apprentice to Journeyworker Ratio:1:3
STEAM BOILER OPERATOR
OPERATING ENGINEERS LOCAL 4

12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 103	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
2	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
3	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
4	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
5	55	\$25.53	\$13.00	\$15.51	\$0.00	\$54.04
6	60	\$27.85	\$13.00	\$15.88	\$0.00	\$56.73
7	65	\$30.17	\$13.00	\$16.26	\$0.00	\$59.43
8	70	\$32.49	\$13.00	\$16.62	\$0.00	\$62.11
9	75	\$34.82	\$13.00	\$17.00	\$0.00	\$64.82
10	80	\$37.14	\$13.00	\$17.37	\$0.00	\$67.51

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
2	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
3	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
4	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
5	55	\$26.59	\$13.00	\$15.58	\$0.00	\$55.17
6	60	\$29.00	\$13.00	\$15.96	\$0.00	\$57.96
7	65	\$31.42	\$13.00	\$16.34	\$0.00	\$60.76
8	70	\$33.84	\$13.00	\$16.73	\$0.00	\$63.57
9	75	\$36.26	\$13.00	\$17.11	\$0.00	\$66.37
10	80	\$38.67	\$13.00	\$17.48	\$0.00	\$69.15

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2022	\$58.09	\$11.49	\$22.34	\$0.00	\$91.92
	02/01/2023	\$59.29	\$11.49	\$22.34	\$0.00	\$93.12
	08/01/2023	\$61.34	\$11.49	\$22.34	\$0.00	\$95.17
	02/01/2024	\$62.59	\$11.49	\$22.34	\$0.00	\$96.42
	08/01/2024	\$64.69	\$11.49	\$22.34	\$0.00	\$98.52
	02/01/2025	\$65.99	\$11.49	\$22.34	\$0.00	\$99.82
	08/01/2025	\$68.14	\$11.49	\$22.34	\$0.00	\$101.97
	02/01/2026	\$69.49	\$11.49	\$22.34	\$0.00	\$103.32
	08/01/2026	\$71.69	\$11.49	\$22.34	\$0.00	\$105.52
	02/01/2027	\$73.09	\$11.49	\$22.34	\$0.00	\$106.92

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.05	\$11.49	\$22.34	\$0.00	\$62.88
2	60	\$34.85	\$11.49	\$22.34	\$0.00	\$68.68
3	70	\$40.66	\$11.49	\$22.34	\$0.00	\$74.49
4	80	\$46.47	\$11.49	\$22.34	\$0.00	\$80.30
5	90	\$52.28	\$11.49	\$22.34	\$0.00	\$86.11

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.65	\$11.49	\$22.34	\$0.00	\$63.48
2	60	\$35.57	\$11.49	\$22.34	\$0.00	\$69.40
3	70	\$41.50	\$11.49	\$22.34	\$0.00	\$75.33
4	80	\$47.43	\$11.49	\$22.34	\$0.00	\$81.26
5	90	\$53.36	\$11.49	\$22.34	\$0.00	\$87.19

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$42.58	\$9.10	\$17.72	\$0.00	\$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.30	\$9.10	\$17.72	\$0.00	\$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.92	\$13.41	\$16.01	\$0.00	\$67.34
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$54.81	\$9.35	\$18.42	\$0.00	\$82.58
	06/01/2023	\$55.81	\$9.35	\$18.42	\$0.00	\$83.58
	12/01/2023	\$57.06	\$9.35	\$18.42	\$0.00	\$84.83
	06/01/2024	\$58.54	\$9.35	\$18.42	\$0.00	\$86.31
	12/01/2024	\$60.01	\$9.35	\$18.42	\$0.00	\$87.78
	06/01/2025	\$61.51	\$9.35	\$18.42	\$0.00	\$89.28
	12/01/2025	\$63.01	\$9.35	\$18.42	\$0.00	\$90.78
	06/01/2026	\$64.56	\$9.35	\$18.42	\$0.00	\$92.33
	12/01/2026	\$66.06	\$9.35	\$18.42	\$0.00	\$93.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$56.81	\$9.35	\$18.42	\$0.00	\$84.58
	06/01/2023	\$57.81	\$9.35	\$18.42	\$0.00	\$85.58
	12/01/2023	\$59.06	\$9.35	\$18.42	\$0.00	\$86.83
	06/01/2024	\$60.54	\$9.35	\$18.42	\$0.00	\$88.31
	12/01/2024	\$62.01	\$9.35	\$18.42	\$0.00	\$89.78
	06/01/2025	\$63.51	\$9.35	\$18.42	\$0.00	\$91.28
	12/01/2025	\$65.01	\$9.35	\$18.42	\$0.00	\$92.78
	06/01/2026	\$66.56	\$9.35	\$18.42	\$0.00	\$94.33
	12/01/2026	\$68.06	\$9.35	\$18.42	\$0.00	\$95.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$46.88	\$9.35	\$18.42	\$0.00	\$74.65
	06/01/2023	\$47.88	\$9.35	\$18.42	\$0.00	\$75.65
	12/01/2023	\$49.13	\$9.35	\$18.42	\$0.00	\$76.90
	06/01/2024	\$50.61	\$9.35	\$18.42	\$0.00	\$78.38
	12/01/2024	\$52.08	\$9.35	\$18.42	\$0.00	\$79.85
	06/01/2025	\$53.58	\$9.35	\$18.42	\$0.00	\$81.35
	12/01/2025	\$55.08	\$9.35	\$18.42	\$0.00	\$82.85
	06/01/2026	\$56.63	\$9.35	\$18.42	\$0.00	\$84.40
	12/01/2026	\$58.13	\$9.35	\$18.42	\$0.00	\$85.90
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$48.88	\$9.35	\$18.42	\$0.00	\$76.65
	06/01/2023	\$49.88	\$9.35	\$18.42	\$0.00	\$77.65
	12/01/2023	\$51.13	\$9.35	\$18.42	\$0.00	\$78.90
	06/01/2024	\$52.61	\$9.35	\$18.42	\$0.00	\$80.38
	12/01/2024	\$54.08	\$9.35	\$18.42	\$0.00	\$81.85
	06/01/2025	\$55.58	\$9.35	\$18.42	\$0.00	\$83.35
	12/01/2025	\$57.08	\$9.35	\$18.42	\$0.00	\$84.85
	06/01/2026	\$58.63	\$9.35	\$18.42	\$0.00	\$86.40
	12/01/2026	\$60.13	\$9.35	\$18.42	\$0.00	\$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
WAGON DRILL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	09/04/2022	\$63.49	\$14.07	\$18.36	\$0.00	\$95.92
	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Additional Apprentices Information:

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

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

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

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

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

SECTION 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 and Special Site Considerations and Soils Excavate Handling.
- 3. Work under Owner's separate contracts.
- 4. Contractor's use of site and premises.
- 5. Coordination with occupants.
- 6. Work restrictions.
- 7. Specification and Drawing conventions.
- 8. Miscellaneous provisions.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
- 2. Section 017300 "Execution."

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: Filippello Park Spray Pad Renovation.

- 1. Project Location: Filippello Park, 191 Grove St, Watertown, Massachusetts. Site access shall be from the existing park entrance off Grove Street.

- B. Owner: City of Watertown, Massachusetts.

- C. Engineer: CDM Smith 75 State Street, Suite 701 Boston, Massachusetts 02109.

1.5 WORK COVERED BY CONTRACT DOCUMENTS AND SPECIAL SITE CONSIDERATIONS AND SOILS EXCAVATE HANDLING

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
1. The work includes demolition, clearing, removals and disposal of existing spray pad and equipment, drains, water service lines, electrical service, spray pad water service controls and manifold in the adjacent restroom building, installation of a new spray pad, surfacing, equipment, seat blocks, water service lines, electrical service, water service controls and manifold, water pressure reducers, stormwater/sewer diverter structure, sewer backflow preventor and other Work indicated in the Contract Documents.
 2. Filippello Park is constructed over a former landfill. All work to comply with the Department of Environmental Protection SW-45 Order of Conditions (Appended to these specifications)
 3. A designated excavate disposal area has been included as shown on the Drawings. All subgrade soils excavated below the top 12-inches from existing grade shall be placed in this area and covered with 2 feet of common fill, a 6-inch layer of new imported sandy gravel fill and final cover shall be a 6-in layer new imported topsoil (loam) for a total of 3-ft of cover. This area is primarily for soil excavate resulting from installation of storm pipe, sewer pipe, structures, water service lines and electrical conduit.
 4. Demolition debris including rock, asphalt, brick and concrete removed from excavations shall be removed and disposed of.
 5. Excavate requiring temporary stockpiling prior to final placement in the designated excavate disposal areas shall be covered with impermeable tarp or liner as approved by Engineer until final placement in the designated excavate disposal area.
 6. Project will be constructed under a single prime contract.

1.6 CONTRACTOR'S USE OF SITE

- A. Limits on Use of Site: Limit use of Project site to areas within the limits of work, contractor access and contractor staging areas as indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. Areas outside the limit of work within Filippello Park will remain open to the public throughout the construction contract.
1. Driveways, Walkways and Entrances: Keep driveways, walkways, and entrances serving premises clear and available to the public, Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Staging and storage area: A portion of the parking lot will be available for storage of equipment and materials. Contractor to coordinate use of the parking lot with DPW and Engineer. Use of the parking area for staging and storage of materials shall not inhibit use of the parking area by the public. Temporary chain link fence shall be installed around staging and stockpile area.

- C. Access to the spray pad on paved pathway only no vehicle traffic will be allowed on grass areas.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy the site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the public's use and Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 24 hours in advance of activities that will affect Owner's operations or public access.

1.8 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.

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. Imperative mood and streamlined language are generally used in the Specifications. 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.
 - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011000

SECTION 012000 - PRICE AND PAYMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Lump sum prices.

1.2 LUMP SUM PRICES

- A. Payment of the lump sum price bid shall constitute full compensation for all labor, materials, tools, equipment and incidentals necessary for constructing the Filippello Park Spray Pad Renovation Project, complete, as shown and as specified in Divisions 01 through 33.

1.3 EXTRA WORK

- A. Extra work, if any, will be performed in accordance with Article 11 of the General Conditions and will be paid for in accordance with the provisions of Article 13 of the General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012000

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.

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 items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Engineer at earliest possible date, but no later than ten days before the date scheduled for submittal of initial Applications for Payment.
- 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. Owner's name.
 - c. Owner's Project number.
 - d. Name of Engineer.
 - e. Engineer's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
 - 2. Arrange schedule of values consistent with format of EJCDC Document C-620 or form acceptable to Owner.

3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of 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.
6. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
7. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
8. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
9. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
10. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

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 Engineer and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Engineer by the of the 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 Engineer.
- D. Application for Payment Forms: Use EJCDC Document C-620 or form acceptable to Owner, as form for Applications for Payment.
1. Other Application for Payment forms proposed by the Contractor may be acceptable to Engineer and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer 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.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment.
 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.
- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer 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.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

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.
- I. Maintain an updated set of drawings to be used as record drawings in accordance with Section 017839 "Project Record Documents." As a prerequisite for monthly progress payments, exhibit the updated record drawings for review by Owner and Engineer for completeness and accuracy.
- J. 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. Schedule of values.
 3. Contractor's construction schedule.
 4. Products list (preliminary if not final).
 5. Submittal schedule.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 7. Initial progress report.
 8. Report of preconstruction conference.
- K. Application for Payment at Substantial Completion: After Engineer 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.
 - a. Complete administrative actions, submittals, and Work proceeding this application, as described in Section 017700 "Closeout Procedures."
 2. Include initial submittal of closeout record drawings in accordance with Section 017839 "Project Record Documents."
 3. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. 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. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

4. Final submittal of closeout record drawings in accordance with Section 017839 “Project Record Documents.”
5. Updated final statement, accounting for final changes to the Contract Sum.
6. AIA Document G706.
7. AIA Document G706A.
8. AIA Document G707.
9. Waivers and releases.

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. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Engineer, 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, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 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. Cellular telephone

numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to 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.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. Engineer will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Engineer will return without response those RFIs submitted to Engineer by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Engineer.
 5. Engineer's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. 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. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working 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 Engineer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt by Engineer of additional information.
3. Engineer'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 Paragraphs 11.04 and 11.05 of the Conditions of the Contract.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 5 days of receipt of the RFI response.
- D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer.
 4. RFI description.
 5. Date the RFI was submitted.
 6. Date Engineer's response was received.
 7. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 8. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- E. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Engineer's Digital Data Files: Digital data files of Engineer's CAD drawings will be provided by Engineer for Contractor's use during construction.
 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Engineer, prepare 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.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Engineer will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement.
 1. Attendees: Authorized representatives of Owner, Engineer, 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.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Procedures for processing field decisions and Change Orders.
 - h. Procedures for RFIs.
 - i. Procedures for testing and inspecting.
 - j. Procedures for processing Applications for Payment.
 - k. Distribution of the Contract Documents.
 - l. Submittal procedures.
 - m. Preparation of Record Documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for disruptions and shutdowns.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. Security.
 - x. Progress cleaning.
 - y. List of major subcontractors and suppliers.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

- C. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Engineer, but no later than 14 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Engineer, 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. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment including final change order.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements including certificate of occupancy and closeout of permits.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 - p. Final cleaning.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Engineer, 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) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will 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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013100

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. Concealed Work photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

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 .
- B. Digital Photographs: Submit image files within seven days of taking photographs.
 - 1. Submit photos on thumb-drive. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description :
 - a. Name of Project.
 - b. Date photograph was taken.
 - c. Description of location, vantage point, and direction.
- C. CONSTRUCTION PHOTOGRAPHSGeneral: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.

- D. Preconstruction Photographs: Before commencement of the Work take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.
 - 1. Flag excavation areas and construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
- E. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.
 - 6. Stormwater system excavations and structures.
- F. Periodic Construction Photographs: Take 20 photographs weekly . Select vantage points to show status of construction and progress since last photographs were taken.
- G. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Engineer will inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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:

- 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
 - 4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 6. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

DEFINITIONS

- C. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Engineer'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."

1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 14 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.4 SUBMITTAL FORMATS

- A. Numbering System: Utilize the following example submittal identification numbering system to identify submittals and as file names for PDF submissions:
1. First Identifier - Alphabet Character: D, S, M or I which represents Shop Drawing (including working drawings and product data), Sample, Manual (Operating & Maintenance) or Informational, respectively.
 2. Second Identifier - Next 6 or 8 Digits: Applicable Specification Section Number. Do not mix submittals from different specification sections into a single submittal.
 3. Third Identifier - Next Three Digits: Sequential number of each separate item or drawing submitted under each Specification Section, in chronological order submitted, starting at 001.
 4. Fourth Identifier - Last Alphabet Character: A to Z, indicating the submission (or resubmission) of the same submittal, i.e., "A" = 1st submission, "B" = 2nd submission, "C" = 3rd submission, etc.
 5. EXAMPLE: D-033000.13-008-B.

- a. D = Shop Drawing.
- b. 03 30 00.13 = Section; use only 6 digits for sections that do not include 8 digits.
- c. 008 = the eighth different submittal under this Section.
- d. B = the second submission (first resubmission) of that particular shop drawing.

B. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Engineer.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

C. Options: Identify options requiring selection by Engineer.

D. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Engineer on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

E. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Engineer will return one copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using Contractor's transmittal form.

- F. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Email: Prepare submittals as PDF package and transmit to Engineer by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Engineer.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
 - 2. Paper: Prepare submittals in paper form and deliver to Engineer.
- 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves 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 on Engineer'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 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer 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 7 days for review of each resubmittal.
- D. 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 Engineer's action stamp.
 4. Repetitive Reviews: Shop drawings, O&M manuals, and other submittals will be reviewed no more than twice at the Owner's expense. All subsequent reviews will be performed at the Contractor's expense. Reimburse the Owner for all costs invoiced by Engineer for the third and subsequent reviews.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. 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 published data are unsuitable 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 catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. 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: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.

- c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
 6. Disposition: Maintain sets 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.
 7. 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.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or 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.

- a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a 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. Provide a notarized signature where indicated.
 2. Insert definition of Contractor certificates here if required by individual Specification Sections. See the Evaluations.
 3. Contractor's Certification: Each shop drawing, working drawing, product data, and sample shall have affixed to it the following Certification Statement:
 - a. "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and

coordinated each item with other applicable approved shop drawings and all Contract requirements. "

4. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
5. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
6. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
7. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
8. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit 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 substrate preparation and primers required.
2. Field Test Reports: Submit written reports 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 in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit 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 in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. 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.
6. Research Reports: Submit 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:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 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 insufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and 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.

1.8 PROPOSED PRODUCT LIST

- A. Within 7 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals 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 Engineer.
- B. Contractor Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences, and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
 - 9. Other requirements enumerated in Contract Documents.
- C. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.

1. Engineer will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ENGINEER'S REVIEW

- A. Do not make mass submittals to Engineer. If mass submittals are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review mass submittals based on priority determined by Engineer after consultation with Owner and Contractor..
- B. Action Submittals: Engineer will review each submittal, indicate corrections or revisions required, and return.
 1. PDF Submittals: Engineer will indicate, via markup on each submittal, the appropriate action as follows:
 - a. Insert description of each action indicated on Engineer's stamp.
 2. Paper Submittals: Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Engineer will discard submittals received from sources other than Contractor.
- G. Submittals not required by the Contract Documents will be returned by Engineer without action.
- H. Shop drawings will be returned to the Contractor with one of the following codes.
 1. "APPROVED" - This code is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.
 2. "APPROVED AS NOTED" - This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
 3. "APPROVED AS NOTED/RESUBMIT" - This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. The resubmittal is to address all comments, omissions and non-conforming items that were noted. An additional box is checked to indicate whether the resubmission is for the complete package, or for parts of the package. If no box is checked, a complete resubmittal shall be

provided. Review code may designate if a partial or full submittal is required. If full submittal is required, a complete resubmittal package addressing all comments shall be provided. If a partial submittal is designated, resubmittal shall only include information pertaining to those items noted in review comments requiring clarification and any portions of submittal impacted as a result of the response. Resubmittal is to be received by the Engineer within 30 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

4. "REJECTED" - This code is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the Contract Documents.
5. "RECEIPT ACKNOWLEDGED (Not subject to Engineer's Approval)" - This code is assigned to acknowledge receipt of a submittal that is not subject to the Engineer's approval. This code is generally used with submittals involving the Contractor's means and methods of construction work plans, and health and safety plans.

1.11 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
 1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
 2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
 3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
 4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
 5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
 6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer/Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013300

SECTION 013529 – SAFETY, HEALTH, AND EMERGENCY RESPONSE PLAN REQUIREMENTS (HW PROJECTS)

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 the following:
 - 1. Site specific health and safety procedures, including a detailed accident prevention plan are required due to the potentially hazardous conditions at this site. These procedures shall be described in a Safety, Health and Emergency Response Plan (SHERP) prepared by the Contractor. The SHERP shall be submitted to the Engineer and be reviewed by the Engineer and Owner before any Work at the site can be initiated. The Contractor is responsible for the Contractor's workers and subcontractors' health and safety. Implement, maintain and enforce the SHERP procedures at the appropriate time prior to and during all phases of the Work.
 - 2. Utilize the services of a health and safety professional designated the Health and Safety Manager (HSM) to develop and implement the SHERP, including the air monitoring program, conduct initial site-specific training and provide support for all health and safety activities as needed, including the upgrading or downgrading of the level of personnel protection.

1.3 DEFINITIONS

- A. Health and Safety Manager (HSM): The employee assigned to develop the SHERP and assume full responsibility for the health and safety program. The HSM shall meet the qualifications of a Certified Industrial Hygienist as defined below.
- B. Monitoring: Indicates the use of field instrumentation to provide information regarding the levels of organic vapors which are being released during remedial action. Monitoring shall be conducted to evaluate employee exposures to toxic materials.
- C. Physician: A licensed physician with experience in the practice of occupational medicine.

1.4 ACTION SUBMITTALS

- A. Submit, in accordance with Section 013300 "Submittal Procedures", and within 14 days after issuance of Notice to Proceed, the following:
 - 1. Health and Safety Plan.

1.5 INDUSTRIAL HYGIENIST, SITE SAFETY AND HEALTH OFFICER

- A. A Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene (ABIH) shall develop and implement the HMH&S Plan, conducting initial site-specific training, providing continued support for all health and safety activities as needed, including upgrading or downgrading of the level of personnel protection as necessary for the duration of the work.
- B. The qualifications of the CIH shall include:
 - 1. A minimum of five years working experience in the chemical or hazardous waste disposal industry.
 - 2. Demonstrable expertise in air monitoring techniques and in the development of personal protective equipment programs for working in potentially toxic atmospheres.
 - 3. Working knowledge of Federal and State occupational safety and health regulations.
 - 4. The name, qualifications (education summary and documentation) and work experience of the CIH shall be submitted to the Engineer for review, prior to development of the HMH&S Plan.

1.6 REGULATORY REQUIREMENTS AND APPLICABLE PUBLICATIONS

- A. Provide a specific SHERP consistent with the requirements of the following:
 - 1. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926
 - 2. NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Site Activities
 - 3. OSHA 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
- B. SHERP: Provide, but not necessarily be limited to, the following components as required by OSHA 29 CFR 1910.120(i)(2):
 - 1. Names of key personnel and alternates responsible for site safety and health (responsibilities and chain of command).
 - 2. Safety and health hazard assessment and risk analysis for each site task and operation (Accident Prevention Plan).
 - 3. Site Description and Evaluation.
 - 4. Education and Training.
 - 5. Personnel Protective Equipment.
 - 6. Medical Surveillance.
 - 7. Air Monitoring.
 - 8. Standard Operating Procedures, Engineering Controls and Work Practices.
 - 9. Site Control Measures (Work Zones, Communications and Security).
 - 10. Personnel Hygiene and Decontamination.
 - 11. Equipment Decontamination and Record Keeping.
 - 12. Emergency Equipment and First Aid Requirements.
 - 13. Emergency Response Plan and Contingency Procedures.
 - 14. Heat/Cold Stress Monitoring.
 - 15. Logs, Reports and Record Keeping.

- C. Six copies of the site specific SHERP shall be submitted to the Engineer within 7 days following the Effective Date of the Agreement and must be approved prior to commencement of any on-site work.
- D. Determination of the appropriate level of worker safety equipment and procedures shall be made by the Contractor as a result of initial site survey review of existing data and a continued safety and health monitoring program performed by the SSHO and approved by the Engineer, in accordance with the requirements specified herein. Existing data indicate that all work can be performed in Level D with contingency procedures to move to Level C protection.
- E. Standards delineated in this Section are in addition to or an amplification of procedures and requirements of the above referenced regulations and documents.
- F. Should any unforeseen or site-specific safety related factor, hazard, or condition become evident during the performance of work at this site, it shall be the Contractor's responsibility to bring such to the attention of the Engineer both verbally and in writing as quickly as possible, for resolution. In the interim, the Contractor shall take prudent action to establish and maintain safe working conditions and to safeguard employees, the public and the environment.
- G. Should the Contractor seek relief from, or substitution for, any portion or provision of the SHERP, such relief or substitution shall be requested of the Engineer in writing and if approved, be authorized in writing.
- H. The SHERP developed by the Contractor shall include provisions for work related to initial site preparation prior to implementation of the facilities described in this Contract. It shall be the responsibility of the Contractor to conduct whatever testing and monitoring is deemed necessary to assure a safe operation during the initial site preparation work.
- I. Any temporary facilities or special construction procedures required to construct the Support and Contamination Reduction Zones shall be the responsibility of the Contractor and shall be delineated in the SHERP.

1.7 FORESEEABLE HAZARDS IN LANDFILL WORK

- A. Hazardous Substances
 - 1. During the execution of construction activities on a closed landfill the possibility exists that potential impacted materials may be uncovered during the excavation portion of the project. This potential possibility exists at depths greater than the 12-in. soil cap. The Contractor should exercise due caution and follow specification requirements to manage impacted materials.
- B. Surface Conditions
 - 1. Landfills include steep slopes and soft unstable soil areas. Surfaces of excavated refuse areas may have voids, soft spots, sharp protruding objects, slippery conditions, or other hazards.
- C. Landfill Gas

1. Decomposing solid waste produces gas consisting of methane, carbon dioxide, and lesser amounts of hydrogen sulfide. Methane may be flammable or explosive when exposed to the air. Carbon dioxide is heavier than air and can displace air in confined spaces, thereby, causing loss of oxygen and potential asphyxiation. Methane and carbon dioxide are both odorless but are usually present with other odorous products created from solid waste decomposition such as hydrogen sulfide. Hydrogen sulfide has a "rotten egg" odor and can be toxic. Other organic vapors associated with the uncontrolled disposal of gasoline, petroleum products, paint products, and domestic or industrial solvents are also routinely encountered in off gases at sanitary landfills. A number of these organic vapors may pose a health hazard even at relatively low concentrations.

1.8 TRAINING

- A. Certify that all personnel assigned to or regularly entering the site for the purpose of performing or supervising work, for health, safety, security, or administrative purposes, for maintenance, or for any other site-related function, have received appropriate safety training in accordance with 29 CFR 1910.120 provided. Training for personnel shall consist of a minimum of 40 hours off-site and 3 days on-site experience. In addition, supervisory personnel shall have a minimum of 8 hours additional specialized training on managing hazardous waste operations. Documentation of all such training shall be submitted to the Engineer before any employees will be allowed in the contaminated area.
- B. All personnel assigned to or entering the site shall complete one site specific refresher training session of at least four hours to guarantee that all such personnel are capable of and familiar with the use of safety, health, respiratory and protective equipment and with the safety and security procedures required for this site.
 1. The site-specific training session shall be conducted by the SSHO. Follow-up refresher training sessions for new personnel or visitors shall be conducted by the HSM or the SSHO using the training curriculum outlines developed by the HSM. The site-specific training program shall address all elements of the SHERP.
- C. All personnel shall receive a minimum of 8 hours per year of retraining while working on the site. Documentation certifying this retraining shall be furnished to the Engineer.
- D. Additionally, guarantee that, personnel not successfully completing the required training are not permitted to enter the site to perform work.

1.9 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

- A. Develop an emergency response and contingency plan for on-site and off-site emergencies, as specified in OSHA 29 CFR 1910.120(l), which shall address at a minimum:
 1. Pre-emergency planning
 2. Personnel roles, lines of authority, training and communication
 3. Emergency recognition and prevention
 4. Safe distances and places of refuge

5. Site security and control
6. Evacuation routes and procedures
7. Decontamination
8. Emergency medical treatment and first aid
9. Emergency alerting and response procedures
10. Critique of response and follow-up
11. Personal Protection Equipment (PPE) and emergency equipment

1.10 PERSONAL PROTECTIVE EQUIPMENT

- A. Provide all on-site personnel with appropriate personal safety equipment and protective clothing, and ensure that all safety equipment and protective clothing is kept clean and well maintained. The Contractor's HSM shall establish upgrade/downgrade "action levels" from the specified minimum levels of protection based upon air monitoring results and direct contact potential. Protocols formally changing the level of protection and the communication network for doing so shall be described in the SHERP. Any changes to the minimum level of protection shall be approved by the SSHO and the Engineer. At a minimum the following items shall be provided:

1. Protective clothing shall be furnished for on-site personnel, consisting of:
 - a. Level D: use as appropriate
 - 1) Coveralls
 - 2) Gloves*
 - 3) Boots/shoes, chemical-resistant steel toe and shank
 - 4) Boots, outer, chemical-resistant (disposable)*
 - 5) Safety glasses or chemical splash goggles*
 - 6) Hard hat
 - 7) Escape mask. Optional as applicable.
 - 8) Face shield. Optional as applicable.
 - b. Level C: use as appropriate
 - 1) Full-face or half-mask, air purifying, canister equipped (NIOSH approved).
 - 2) Hooded chemical-resistant clothing (overalls two-piece chemical-splash suit; disposable chemical-resistant overalls).
 - 3) Coveralls*
 - 4) Gloves, outer, chemical-resistant
 - 5) Gloves, inner, chemical-resistant
 - 6) Boots, outer, chemical-resistant steel toe and shank*
 - 7) Boot-covers, outer, chemical-resistant (disposable)*
 - 8) Hard hat
 - 9) Escape mask*
 - 10) Two-way radios (worn under outside protective clothing)
 - 11) Face shield*
2. All prescription eyeglasses in use on the site shall be safety glasses. Prescription lens inserts shall be provided for full face respirators. Contact lenses are prohibited in the Exclusion and Contamination Reduction Zone.

*Optional as applicable.

3. Footwear used on site shall be steel-toed, steel shank safety shoes or boots, with chemical resistant soles.
4. A written respiratory protection program addressing site specific respirator usage shall be developed by the Contractor's HSM and shall be submitted as part of the SHERP. Programs for respiratory protection shall conform to OSHA 1910.134.
5. All on-site personnel shall wear a hard hat when engaging in construction or drilling activities.
6. All personal protective equipment worn on site shall be decontaminated or properly disposed of at the end of the work day. The SSHO is responsible for ensuring all personal protective equipment is decontaminated before being reissued.
7. Each respirator shall be individually assigned and not interchanged between workers without cleaning and sanitizing. Cartridges/canisters and filters shall be changed daily or upon breakthrough, whichever occurs first. A procedure for assuring periodic cleaning, maintenance and changing of filters shall be provided by the Contractor and addressed in the written respiratory protection program.
8. All protective clothing including work clothing and safety boots which have entered the Contamination Reduction and Exclusion Zones shall be properly disposed of or decontaminated at the completion of the work day.
9. Level D shall be the minimum level of protection set for all primary operations performed in the Exclusion Zone, unless an upgrade is required in accordance with the provisions set forth in the Air Monitoring program.

1.11 AIR MONITORING

A. General Requirements:

1. The Contractor's HSM shall design, develop, and implement an Air Monitoring Program to detect the release of volatile organic compounds associated with the remedial work.
2. Information gathered during the air monitoring program shall be used to determine appropriate safety and personnel protective measures to be implemented, during the cleanup operations and to document onsite employees' exposures.

B. General Responsibilities

1. The HSM shall be responsible for establishing air monitoring strategies and protocols using an organic vapor analyzer (OVA) in order to quantify the airborne release of organic vapors during remediation work. These strategies and protocols shall address appropriate air monitoring for volatile organic compounds in the active work zones of the site. This will include, at a minimum, areas in which intrusive activities are being conducted, such as well installation and pipeline trench excavation, the area around the ground water treatment system, and monitor well sampling. The Contractor's HSM shall utilize previous site characterization and sampling data summaries upon which to initially develop the air monitoring protocols.
2. Establish and document baseline (background) air quality conditions prior to commencement of work, for conducting air monitoring during onsite work, and for documenting air quality conditions after completion of site remediation work.
3. All air monitoring equipment required shall be provided by the Contractor and shall be maintained and calibrated according to EPA and NIOSH analytical methods and/or manufacturers' recommendations. Such maintenance and calibration data shall be recorded.

4. All air monitoring equipment shall be operated by personnel trained in their specific use (i.e., SSHO).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013529

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.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, 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.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- 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, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

- E. **Product Tests:** Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. **Source Quality-Control Tests and Inspections:** Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- G. **Testing Agency:** An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- H. **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.
- I. **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. Contractor's quality-control services do not include contract administration activities performed by Engineer..

1.4 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 Engineer.
- B. **Delegated-Design Services Statement:** Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

- A. **Conflicting Standards and Other Requirements:** If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Engineer regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Engineer for clarification 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 Engineer for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Mockup Shop Drawings:

1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel and Delegated-Designer.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, 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.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include Work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. **Manufacturer's Technical Representative's Field Reports:** Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical 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 of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. **Factory-Authorized Service Representative's Reports:** Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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, applying, 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 is similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing and Inspecting Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect, demonstrate, repair and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods. Contractor responsibilities include the following:
 - 1. Provide test specimens representative of proposed products and construction.
 - 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - 4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
 - 5. Build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
 - 6. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 - 7. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer , with copy to Contractor.

Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

1.11 QUALITY CONTROL

- A. Contractor Responsibilities: Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Engage a qualified testing agency to perform quality-control services.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- C. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform duties of Contractor.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- F. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payments.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 2. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Engineer.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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 Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- 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.

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.

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. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).

31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWWA - American Water Works Association; www.awwa.org.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csagroup.com.
65. CSA - CSA International; www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
74. ECIA - Electronic Components Industry Association; www.eciaonline.org.
75. EIA - Electronic Industries Alliance; (See TIA).
76. EIMA - EIFS Industry Members Association; www.eima.com.

77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
85. FM Approvals - FM Approvals LLC; www.fmglobal.com.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
87. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
88. FSA - Fluid Sealing Association; www.fluidsealing.com.
89. FSC - Forest Stewardship Council U.S.; www.fscus.org.
90. GA - Gypsum Association; www.gypsum.org.
91. GANA - Glass Association of North America; www.glasswebsite.com.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
96. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
97. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
98. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
99. IAS - International Accreditation Service; www.iasonline.org.
100. ICBO - International Conference of Building Officials; (See ICC).
101. ICC - International Code Council; www.iccsafe.org.
102. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
103. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
104. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
105. IEC - International Electrotechnical Commission; www.iec.ch.
106. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
107. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
108. IESNA - Illuminating Engineering Society of North America; (See IES).
109. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
110. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
111. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
112. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
113. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
114. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
115. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
116. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
117. ISO - International Organization for Standardization; www.iso.org.
118. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
119. ITU - International Telecommunication Union; www.itu.int/home.

120. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
121. LMA - Laminating Materials Association; (See CPA).
122. LPI - Lightning Protection Institute; www.lightning.org.
123. MBMA - Metal Building Manufacturers Association; www.mbma.com.
124. MCA - Metal Construction Association; www.metalconstruction.org.
125. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
126. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
127. MHIA - Material Handling Industry of America; www.mhia.org.
128. MIA - Marble Institute of America; www.marble-institute.com.
129. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
130. MPI - Master Painters Institute; www.paintinfo.com.
131. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
132. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
133. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
134. NADCA - National Air Duct Cleaners Association; www.nadca.com.
135. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
136. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
137. NBI - New Buildings Institute; www.newbuildings.org.
138. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
139. NCMA - National Concrete Masonry Association; www.ncma.org.
140. NEBB - National Environmental Balancing Bureau; www.nebb.org.
141. NECA - National Electrical Contractors Association; www.necanet.org.
142. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
143. NEMA - National Electrical Manufacturers Association; www.nema.org.
144. NETA - InterNational Electrical Testing Association; www.netaworld.org.
145. NFHS - National Federation of State High School Associations; www.nfhs.org.
146. NFPA - National Fire Protection Association; www.nfpa.org.
147. NFPA - NFPA International; (See NFPA).
148. NFRC - National Fenestration Rating Council; www.nfrc.org.
149. NHLA - National Hardwood Lumber Association; www.nhla.com.
150. NLGA - National Lumber Grades Authority; www.nlga.org.
151. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
152. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
153. NRCA - National Roofing Contractors Association; www.nrca.net.
154. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
155. NSF - NSF International; www.nsf.org.
156. NSPE - National Society of Professional Engineers; www.nspe.org.
157. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
158. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
159. NWFA - National Wood Flooring Association; www.nwfa.org.
160. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
161. PDI - Plumbing & Drainage Institute; www.pdionline.org.
162. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
163. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
164. RFCI - Resilient Floor Covering Institute; www.rfci.com.
165. RIS - Redwood Inspection Service; www.redwoodinspection.com.
166. SAE - SAE International; www.sae.org.

167. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
168. SDI - Steel Deck Institute; www.sdi.org.
169. SDI - Steel Door Institute; www.steeldoor.org.
170. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
171. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
172. SIA - Security Industry Association; www.siaonline.org.
173. SJI - Steel Joist Institute; www.steeljoist.org.
174. SMA - Screen Manufacturers Association; www.smainfo.org.
175. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
176. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
177. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
178. SPIB - Southern Pine Inspection Bureau; www.spib.org.
179. SPRI - Single Ply Roofing Industry; www.spri.org.
180. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
181. SSINA - Specialty Steel Industry of North America; www.ssina.com.
182. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
183. STI - Steel Tank Institute; www.steeltank.com.
184. SWI - Steel Window Institute; www.steelwindows.com.
185. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
186. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
187. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
188. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
189. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
190. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
191. TMS - The Masonry Society; www.masonrysociety.org.
192. TPI - Truss Plate Institute; www.tpinst.org.
193. TPI - Turfgrass Producers International; www.turfgrasssod.org.
194. TRI - Tile Roofing Institute; www.tilerroofing.org.
195. UL - Underwriters Laboratories Inc.; <http://www.ul.com>.
196. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
197. USAV - USA Volleyball; www.usavolleyball.org.
198. USGBC - U.S. Green Building Council; www.usgbc.org.
199. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
200. WA - Wallcoverings Association; www.wallcoverings.org.
201. WASTEC - Waste Equipment Technology Association; www.wastec.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
205. WI - Woodwork Institute; www.wicnet.org.
206. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
207. WWPA - Western Wood Products Association; www.wwpa.org.

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. 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 in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.

- c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
- 6. MILSPEC - Military Specification and Standards; (See DOD).
- 7. USAB - United States Access Board; www.access-board.gov.
- 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

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.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. Installation and removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust Control Plan: Submit coordination drawing and narrative that indicates the dust control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. Other dust-control measures.
- G. Noise Control Plan: Identify construction activities that may impact the existing spaces or adjacent existing buildings, whether occupied by others, or occupied by the Owner.

1.5 QUALITY ASSURANCE

- A. Temporary facilities shall comply with all applicable state and local ordinances, codes and regulations.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. 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. Portable 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 and bottom rails. Provide concrete bases for supporting posts.
- B. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities 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.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where shown on the Drawings or 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.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service, if approved by Owner.
 - 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. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: If approved, connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Final Completion, restore these facilities to condition existing before initial use.

- E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash 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.
 - 1. Toilets: Use of Owner's existing toilet facilities is not permitted.
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Engineer's office.
 - f. Owner's office.
- F. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- G. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- H. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- I. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings. Signs shall be constructed of A-A Ext – APA grade plywood, 1-in thick. Posts and braces shall be of pressure treated lumber.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs, so they are legible at all times.
- J. 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."
- K. 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.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- 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. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion and sedimentation-control Drawings and requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- H. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
 - J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
 - K. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
 - L. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 2. Paint and maintain appearance of walkway for duration of the Work.

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, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 017700 "Closeout Procedures" for submitting warranties.

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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycle contract materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight,

dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.
- F. Substitution: Refer to Paragraph 7.05 of the General Conditions for definition and limitations on substitutions.

1.4 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. Resolution of Compatibility Disputes between Multiple Contractors:
 - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

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 that products are undamaged and properly protected.
- C. Storage:
 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 2. Store products to allow for inspection and measurement of quantity or counting of units.
 3. Store materials in a manner that will not endanger Project structure.
 4. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection for wind.
 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 7. Protect stored products from damage and liquids from freezing.
 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to 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 in the Project Manual, 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 meeting requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Engineer 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.
 - a. Submit additional documentation required by Engineer through Construction Manager in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Engineer, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following.
2. Sole 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 or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following.
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following.
4. Non-Limited List of Products: 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.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following.
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following.
6. Non-Limited List of Manufacturers: 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.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following.

- b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
- 7. 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 may additionally 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.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Paragraph 7.05 of the General Conditions for substitutions for convenience.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance the following requirements:
 - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 - 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 Engineers and owners, if requested.
 - 5. Samples, if requested.
- B. Engineer's Action on Comparable Products Submittal: If necessary, Engineer will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
 - 1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 - 2. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.

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. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner's portion of the Work.
 - 6. Coordination of Owner-installed products.
 - 7. Progress cleaning.
 - 8. Starting and adjusting.
 - 9. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for coordination of , and limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Engineer of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.

- b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Layout Conference: Conduct conference at Project site.
- 1. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
 - 2. Review requirements for including layouts on Shop Drawings and other submittals.
 - 3. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.
- D. 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.
- E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.7 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 014000 “Quality Requirements.”
- C. 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, or when encountering the need for cutting and patching of elements, whose structural function is not known, notify Engineer of locations and details of cutting and await directions from Engineer 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.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 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 Engineer for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. 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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

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 sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- 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, including Specification Section number and paragraphs, and Drawing sheet number and detail, where applicable.
 - 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. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. 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.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer in accordance 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, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Engineer promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. 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 satisfactory results as judged by Engineer. 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 of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items onsite and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 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, as judged by Engineer. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

- A. 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. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.

- D. 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.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."
- F. 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.
- G. 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. Excavating and 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.
- H. 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, as judged by Engineer. 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 eliminate 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.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. 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: 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 ensure 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.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION AND REPAIR 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. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. 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.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Section 013233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Engineer's use prior to Engineer's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.

- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 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 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, 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 Engineer. Label with manufacturer's name and model number.
 - 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 Engineer's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing 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 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. Advise Owner of changeover in utility services.
 6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 8. Complete final cleaning requirements.
 9. Touch up paint 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 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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 Engineer, that must be completed or corrected before certificate will be issued.
1. 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.

1.8 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 in accordance with Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. 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.
 5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 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.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit on digital media acceptable to Engineer by email to Engineer.
- E. Warranties in Paper Form:
 - 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.
- F. 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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

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 of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or 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 labels that are not permanent.
 - h. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - i. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - j. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017839 - PROJECT RECORD DOCUMENTS

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 Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
 - 5. Operating and Maintenance Manual
 - 6. As-Built Survey
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for maintaining and exhibiting project record documents as a prerequisite for progress payments.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and one set of file prints.
 - 3) Submit Record Digital Data Files and one set of plots.
 - 4) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit three paper-copy sets of marked-up record prints.

- 2) Submit PDF electronic files of scanned Record Prints and three sets of file prints.
 - 3) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files and 1 paper copy of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories and 1 paper copy of each submittal.
 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Work Change Directive.
 - k. Changes made following Engineer's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.

- n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Engineer. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
- 1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
 - 2. Format: DWG
 - 3. Format: Annotated PDF electronic file.
 - 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - 5. Refer instances of uncertainty to Engineer for resolution.
 - 6. Engineer will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
- a. See Section 013100 "Project Management and Coordination" for requirements related to use of Engineer's digital data files.
 - b. Engineer will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file..
 - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Engineer.
 - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file .
 - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file .
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 PROJECT MANUAL AND OPERATING AND MAINTENANCE MANUAL

- A. Assemble and deliver to the Engineer for approval and transmittal to Owner three copies of the Project manual including approved shop submittals indexed by specification section, construction photographs, as-built documents and approved payment applications, descriptive information, catalog cuts, maintenance instructions, parts lists for each site fixture and warranties.
- B. The document shall also include service, maintenance and cleaning instructions for all manufactured products, finishes and systems.
- C. Each volume of the manual shall be clearly indexed, and shall include a directory of all Subcontractors, material suppliers, local maintenance organizations indicating the area of responsibility of each, and the name and telephone number of the responsible member of each organization.

1.9 AS-BUILT SURVEY

- A. Upon project completion prepare and deliver to the Engineer for approval and transmittal to Owner an as-built survey in Autocad format, As-built information shall include surface grades as well as all subsurface utilities with details and ties to ensure they can be field located. As-built survey shall be submitted with final payment request.

1.10 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours. As a prerequisite for monthly progress payments, exhibit the updated record documents for review by Owner and Engineer for accuracy and completeness.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 017839

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earthwork."

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials change, source of cement or aggregate change or test results do not meet specification requirements, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, spacing, 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. Reference bars to be the same identification marks shown on the bar bending details.
- D. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.

3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Bonding agents.
7. Semirigid joint filler.
8. Joint-filler strips.
9. Repair materials.
10. Joint Sealant

E. Material Test Reports: For the following, from a qualified testing agency:

1. Mill Test Reports:
 - a. Cementitious materials.
 - b. Steel Reinforcing.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer, manufacturer, and independent testing agency responsible for concrete design mixtures.
- B. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork. Formwork shop drawings shall be stamped and sealed by a professional engineer registered in the Commonwealth of Massachusetts.
- C. PE Certification form for the design of formwork and shoring.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Provide reinforcement free from mill scale, rust, mud, dirt, grease, oil, ice, or other foreign matter that will reduce or destroy bond. Deliver, store, and handle steel reinforcement to prevent bending and damage. Store reinforcement off the ground, protect from moisture, and keep out of standing water, and free from rust, mud, dirt, grease, oil, ice, or other contaminants and deleterious films that will reduce or destroy bond.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
- B. Tie wires for reinforcement: 16 gauge or heavier black annealed wire to tie uncoated reinforcing. Use zinc coated wire to tie galvanized reinforcing. Use epoxy coated wire to tie epoxy coated reinforcing.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type II,.
 - 2. Fly Ash: ASTM C 618, Class F.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: ASTM C33 Size Number 57 nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- F. Water: ASTM C 94/C 94M and potable.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, Type III, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Joint Sealants: Comply with ASTM C 920 Type S or M, Grade P or NS, Class 25. Provide gray colored sealants unless otherwise indicated, specified, or approved.

2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Slag Cement: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, for placement and workability.
 - 2. High-range water-reducing admixture in concrete, may be used, for placement and workability.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and foundations: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4500 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.42.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 3.5 to 5 percent,
- B. Slabs-on-Grade: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4500 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.42.
 - 3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 - 4. Slump Limit: 4 inches, plus or minus 1 inch.
 - 5. Air Content: 3.5 to 5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, ice, snow and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. 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 exposed concrete surfaces unless approved by Engineer.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose mill scale, rust, mud, dirt, grease, oil, ice, and other foreign materials that reduce or destroy the bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, only where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing, 1.3 times the development length, or 8 inches, whichever is greater. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Splicing:
 - 1. Lap splices in welded wire fabric in accordance with the requirements of ACI 318 but not less than 12 inches. Tie the spliced fabrics together with wire ties spaced not more than 24 inches on center and lace with wire of the same diameter as the welded wire fabric. Offset splices in adjacent widths to prevent continuous splices.
 - 2. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. Intentionally roughen concrete surface and remove laitance prior to applying bonding agent.
 - 3. At construction joints and at concrete joints indicated on Drawings to be "roughened", uniformly roughen the surface of concrete to a full amplitude (distance between high and low points and side to side) of 1/4 inch with chipping tools to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by waterblasting or sandblasting and prepare for bonding. At least two hours before and again shortly before the new concrete is deposited, saturate joints with water. After glistening water disappears, coat joints with neat cement slurry mixed to consistency of very heavy paste. Coat surfaces to a depth of at least 1/8 inch thick, scrubbed-in by means of stiff bristle brushes. Deposit new concrete before the neat cement dries.

4. Do not use keyways in construction joints unless specifically shown on the Drawings or approved by the Engineer.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips below finished concrete surface where joint sealants are indicated. Terminate joint filler as required by sealant manufacturer or as indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid “cold” joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to

consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- D. Deposit and consolidate concrete for floors and slabs 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.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

- A. Finish concrete surfaces according to ACI 301.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to view,.
- D. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. 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 restraighening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated.
- C. 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. Apply a trowel finish to surfaces indicated.
 - 2. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, 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 Engineer before application.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.
- D. Install sealants in clean dry recesses free of frost, oil, grease, form release agent, loose material, laitance, dirt, dust, and other deleterious materials that will impair bond. Apply sealant conforming to manufacturer's recommendations including concrete cure, temperature, moisture, mixing, primer, primer cure time, joint and recess preparation, tooling, and curing. Apply masking tape to each side of joint prior to sealant installation. Remove masking tape afterwards, along with any spillage to leave a sealant installation with neat straight edges.
- E. Do not use asphaltic bond breakers or asphaltic joint fillers in joints receiving sealant.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit sawcut at the perimeter of the area to a depth of 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place

patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.12 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Notify the Owner when the reinforcing is complete and ready for inspection, at least six working hours prior to the proposed concrete placement. Do not cover reinforcing steel with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been inspected by the Owner's inspection agency and the Owner's inspection agency release to proceed with the concreting has been obtained. Keep forms open until the Owner's inspection agency has completed inspection of the reinforcement.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements by the Owner's testing agency:
 - 1. Testing Frequency: One composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Testing Frequency: One composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests will be performed when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

- b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 - 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 - 11. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
 - 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 033000

SECTION 129300 - SITE FURNISHINGS

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. Specimen Granite Blocks (for perimeter seating)

- B. Related Requirements:

- 1. Section 310515 "Soils and Aggregates for Earthwork" for subgrade materials.
 - 2. Section 312000 "Earthwork" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

- A. Provide source, location and photographs of specimen granite blocks. Accompany Engineer and Owner to visit supplier. Specimens to be hand selected by Owner.

PART 2 - PRODUCTS

2.01 SPECIMEN GRANITE BLOCKS (For seating area)

- A. Specimen granite piece: native, solid, hard rock, hand selected from stockpiles of reclaimed sources of miscellaneous natural stone, approximately 5-ft long x 2-ft wide by 2-ft deep, each roughly rectangular or cubic in shape, and smooth in character.
- B. The dominant color: earth tones (mostly light grey). Natural color variation characteristics of the deposit from which the granite is obtained will be acceptable. The stone may have previously carved or sculpted portions, but otherwise shall be non-processed, except for removal of unacceptable edges, points, laminates, seams, cracks, fissures or other structural imperfections or flaws which would impair its structural integrity.
- C. Size of selected specimen granite pieces: approximately 5-ft long x 2-ft wide by 2-ft deep, 6-inches to be placed below grade

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. SPECIMEN GRANITE BLOCKS

- 1. See Drawings for approximate locations.
- 2. Material shall be washed prior to installation. Part of the natural stone shall be buried, so any sharp points or ends will not be exposed after installation.
- 3. Install each specimen granite piece on top of compacted subgrade. Each specimen granite piece shall be 1/3 buried and shall have its exact position and orientation field directed by the Engineer.

END OF SECTION 129300

SECTION 131413 - SPRAY EQUIPMENT

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 GENERAL REQUIREMENTS

- A. The conditions of the Contract and Division 1 General Requirements apply to the Work under this Section.
- B. All references to products by manufacturer, trade name, or performance Specifications bearing the connotation “or Approved Equal” shall be as determined by the Designer and the City, per MGL c. 30 s. 39M, part b, criteria 1.
 - 1. NOTE: Submit proposed alternate manufacturer’s of Spray Equipment for consideration regarding conformance to the specifications prior to bid submission. Alternative manufacturer’s, if submitted after bid submission and found, in the judgement of the Designer and the City, not to be in substantial compliance with the specifications, shall not be considered as grounds for amendment to the Contract Price.

1.3 SUMMARY

- A. Section includes playground equipment as follows:
 - 1. Spray equipment.
- B. Related Requirements:
 - 1. Section 033000 “Cast-in-place Concrete” for materials for concrete foundation.

1.4 DEFINITIONS

- A. Definitions in ASTM F2461 - F2461 – Standard Practice for Manufacture, Construction, Operation and Maintenance of Aquatic Play Equipment apply to Work of this Section.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of spray element.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include manufacturers descriptive data, specifications and installation instructions.
 - 3. Include all details for spray features, activation bollards and any other pertinent component of the overall system.
 - 4. Design drawings for concrete foundations for spray equipment, indicating all details of construction, including, but not limited to, locations, plan dimensions, thicknesses, and details of reinforcing steel.
 - 5. Anchor bolt details for anchorage of spray equipment to concrete foundation. Include anchor bolt locations, sizes, type, quantity, material, embedment length, and minimum edge distance.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Product Certificates: For each type of spray equipment.
- C. Sample Warranty: For manufacturer's special warranties.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For spray equipment and finishes to include in maintenance manuals.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastics, plastic finishes, metals, metal finishes, wood, wood finishes and other materials beyond normal weathering and use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLAYGROUND EQUIPMENT

- A. Source Limitations: Obtain playground equipment from single source from single manufacturer.
- B. Basis of Design: The equipment listed below is based upon a spray deck system by Vortechtechnics.
- C. Playground equipment and components shall have the IPEMA Certification Seal.
- D. Basis of design products are subject to compliance with requirements. For all products listed below, provide models as manufactured and supplied by Kompan Inc. – 605 W Howard Lane, Suite 101, Austin, TX 78753 www.kompan.us: Or comparable product by one of the following:
 1. Landscape Structures Inc.
 2. Berliner Seilfabrik Play Equipment Corporation
 3. Dynamo Playgrounds
 4. Or approved equal.
- E. Freestanding Playground Equipment:
 1. Swing (2 bay) - plan designation “A1”
 2. Freestanding bird house – plan designation “B1”
 3. Freestanding canoe - plan designation “C1”
 4. Freestanding spring rider - plan designation “D1”
 5. Double embankment slide – plan designation “E1”
 6. Agility structure – plan designation “F1”
 7. Spinning ring – plan designation “G1”
 8. Rope climber – plan designation “H1”
 9. Carousel – plan designation “I1”
 10. Freestanding spinner – plan designation “J1”
 11. Freestanding spinner – plan designation “K1”
 12. Swing (3 bay) – plan designation “L1”
 13. Log balance beam – plan designation “M1”
 14. Treehouse play structure – plan designation “N1”
- F. Hillside climber half spheres
- G. Hillside climber handholds
- H. Reed posts – Add Alternate

2.2 PERFORMANCE REQUIREMENTS

- A. Safety Standard:
 1. Provide playground equipment according to:

- a. ASTM F1487-17 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.
- b. ASTM F2373 Standard Consumer Safety Performance for Public Use Play Equipment for Children 6 Months Through 23 Months.
- c. IPEMA (International Play Equipment Manufacturer's Association) Certification

B. Structural Performance:

1. Design concrete foundation for playground equipment and anchorage of playground equipment to concrete foundation in accordance with the Massachusetts State Building Code.
2. Design for all applicable loads including, but not limited to, live loads, snow loads, wind loads, ice loads, and seismic loads, and all applicable load combinations.
3. Design concrete foundations in accordance with ACI 318 and the following parameters:
 - a. Concrete strength: 28-day compressive strength of 4500 psi per Section 033000, "Cast-in-Place Concrete."
 - b. Reinforcing steel: ASTM A615, Grade 60, per Section 033000, "Cast-in-Place Concrete."
 - c. Gross allowable bearing pressure: 500 psi
 - d. Coefficient of Friction between bottom of concrete foundation and sand sub-base: 0.45
 - e. Factor of Safety against Sliding: 1.50
 - f. Factor of Safety against Overturning: 2.00
4. Design anchor bolts embedded into the concrete foundation in accordance with ACI 318 Chapter 17. Assume new concrete is cracked.

2.3 FREESTANDING PLAYGROUND EQUIPMENT

- A. Swing Set 2-Bay, Plan Designation "A1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Swing, 8ft H KSW92003 with Baby Seat 8ft H SW990023" or approved equal.

1. Metal Frame: Hot Dipped Galvanized-steel pipe or tubing with powder coated finish.
 - a. Leg Upright(s): Not less than 3-1/2-inch OD.
 - b. Overhead Beam: Not less than 3-1/2-inch OD.
 - c. Color: As selected by Designer from manufacturer's full range.
2. Overhead Beam Height: 96-inches from pivot point to protective surfacing below.
3. Suspension Members: Short link stainless steel chain not permitting finger penetration.
4. Swing Connector: Stainless steel hook enclosed in UV stabilized housing with lifetime sealed ball bearings .
5. Swing Hanger: Stainless steel snake-eye bolt secured through anti twist housing.
6. Swing Seats: Enclosed, full-bucket infant/tot seat made from Polypropylene inner core with rubber exterior.
 - a. Color: As selected by Designer from manufacturer's full range.

7. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 8. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 9. Arrangement: As indicated on Drawings.
 10. Capacity: Two swing(s).
 11. Age Appropriateness: One and above.
- B. Freestanding Birdhouse, Plan Designation "B1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Village Shop – Customized NRO404 with circular "birdhouse" door opening" or approved equal.
1. Material: Robinia pseudoacacia wood walls, roof, and support timbers, sanded smooth and free of splinters or angled edges.
 2. Overall Dimensions: 6'-0" wide x 6'-6" deep x 8'-5" height.
 3. Color: Natural untreated walls and support timbers. Roof painted Blue as selected by Designer from manufacturer's full range.
 4. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 5. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 6. Hardware: Stainless steel
 7. Arrangement: As indicated on Drawings.
 8. Capacity: Six users.
 9. Age Appropriateness: One and above.
- C. Freestanding Canoe, Plan Designation "C1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Canoe Springer KRS8200053 Custom" or approved equal.
1. Seat(s): 19mm HDPE molded recycled synthetic panels, handholds and footrests.
 - a. Seat Style: Canoe.
 - b. Color: Brown and Tan as selected by Designer from manufacturer's full range.
 2. Frame: 2- epoxy primed polyester powder coated steel tubing coil springs with steel base plates.
 - a. Color: Blue as selected by Designer from manufacturer's full range.
 3. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 4. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 5. Arrangement: As indicated on Drawings.
 6. Capacity: Four user(s).
 7. Age Appropriateness: Two through 5 years.
- D. Freestanding Spring Rider, Plan Designation "D1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Gander M10670" or approved equal.

1. Seat(s): UV stabilized High Density Polyurethane seat and backrest; with 19mm HDPE recycled synthetic panels, handholds and footrests.
 - a. Seat Style: Gander.
 - b. Color: Red and Yellow as selected by Designer from manufacturer's full range.
 2. Frame: Epoxy primed polyester powder coated steel tubing coil spring with steel base plate.
 - a. Color: Blue as selected by Designer from manufacturer's full range.
 3. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 4. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 5. Arrangement: As indicated on Drawings.
 6. Capacity: Two user(s).
 7. Double Embankment Slide, Plan Designation "E1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Double Embankment Slide NRO892383 Custom" or approved equal. Plan Configuration: Straight-aligned chute(s).
 8. Access: Via platform at summit of elevated mound.
 9. Sit-Down Entrance: With protective wooden wall barrier and overhead wooden handhold and side handholds.
 10. Frame: Manufacturer's standard Robinia pseudoacacia wood walls, crossmembers, and support timbers, sanded smooth and free of splinters or angled edges
 11. Sliding Surface: Inclined.
 12. Sliding Surface Construction: 2-bay, One-piece plastic slide with integral, full-length side rails and center rail.
 13. Colors: Blue, as selected by Designer from manufacturer's full range.
 14. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 15. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 16. Arrangement: As indicated on Drawings.
 17. Capacity: Two user(s).
 18. Age Appropriateness: Two through five years.
- E. Agility Structure, Plan Designation "F1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Agility Package 22 COR10220" or approved equal.
1. Frame: Manufacturer's standard hot dipped galvanized-steel pipe or tubing with powder coat finish.
 - a. Leg Upright(s): Not less than 4-1/2-inch OD.
 - b. Overall Dimensions: 21'-7" wide x 20'-6" deep x 9'-6" height.
 - c. Colors: As selected by Designer from manufacturer's full range.
 2. Accessories:

- a. Rope Webbing: 19mm diameter assembly including galvanized steel wire core wrapped with PES yarn exterior.
 - b. Handhold Vertical Grips: TPU rubber surface handholds with stainless steel rope webbing attachment.
 3. Hardware: vandalism proof 8mm Stainless steel connection S clamps. Stainless steel frame assembly hardware as indicated by manufacturer's designations.
 4. Colors: As selected by Designer from manufacturer's full range.
 5. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 6. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 7. Arrangement: As indicated on Drawings.
 8. Capacity: 41 users.
 9. Age Appropriateness: Five through 12 years.
- F. Spinning Ring, Plan Designation "G1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Supernova GXY916" or approved equal.
1. Rotating Mechanism: Lifetime lubricated vertical and horizontal roller system, fully enclosed and sealed by rubber lists.
 2. Platform: Round, 10 degree tilted polyethylene ring with integrated handholds and slip-resistant footing.
 - a. Color: As selected by Designer from manufacturer's full range.
 3. Frame: Manufacturer's standard hot dipped galvanized-steel pipe or tubing.
 - a. Leg Upright(s): Not less than Five supports with min. 4-1/2-inch OD.
 - b. Overall Dimensions: 6'-9" diameter x 2'-0" height.
 4. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 5. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 6. Arrangement: As indicated on Drawings.
 7. Capacity: Eight user(s).
 8. Age Appropriateness: Six and above.
- G. Rope Climber, Plan Designation "H1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Hill Climber Rope Type 4 COR10534" or approved equal.
1. Summit Post: Manufacturer's standard lead-free zinc hot dipped galvanized-steel pipe or tubing with min. 4-1/2-inch OD. Manufactured in two sections including exposed summit post with male sleeve attachment at base and steel tubing sleeve to be embedded in poured in place concrete footing.
 2. Climbing Rope: 19mm galvanized steel wire wrapped in PES yarn
 - a. Colors: Yellow As selected by Engineer from manufacturer's full range.

3. Rope Connectors: 360 degree aluminum clamp connector fastened with stainless steel hardware to Summit post. Steel anchor bolt connector embedded in poured in place concrete footing at base of slope.
 4. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 5. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 6. Arrangement: As indicated on Drawings.
 7. Capacity: Six users.
 8. Age Appropriateness: Two through 12 years.
- H. Carousel, Plan Designation "I1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Universal Carousel PCM157-0201" or approved equal.
1. Chassis: Welded, square steep pipe assembly, hot dip galvanized interior and exterior.
 2. Rotating Mechanism: Permanently sealed and lifetime lubricated central bearing supported by min 10 wheels to support outer load.
 3. Platform: Round, flat, non-skid HPL plate, not less than 17.8-mm-nominal thickness, with slip-resistant footing.
 - a. Color: As selected by Designer from manufacturer's full range.
 4. Handholds and Handrails: Hot dipped galvanized steel tubing with lead free zinc coating, powder coated finish coating.
 - a. Color: Green, as selected by Designer from manufacturer's full range.
 5. Dimensions: 6'-10" diameter x 2'-4" height.
 6. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 7. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 8. Arrangement: As indicated on Drawings.
 9. Capacity: Eight users.
 10. Age Appropriateness: Two through 12 years.
- I. Freestanding Spinner, Plan Designation "J1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Spica 1 GXY8014" or approved equal.
1. Rotating Mechanism: Two permanently sealed and lubricated steel ball bearings, fully enclosed with lifetime lubrication.
 2. Platform: Triangular galvanized steel plate with rubber non-slip surface coating, and rounded edges.
 - a. Color: Black, as selected by Designer from manufacturer's full range.
 3. Pole Handhold: Lead-free zinc Hot dipped steel tubing.
 - a. Color: As selected by Designer from manufacturer's full range.

4. Pole Topper: Injection molded UV Stabilized Nylon
 - a. Color: Green, as selected by Designer from manufacturer's full range.
 5. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 6. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 7. Arrangement: As indicated on Drawings.
 8. Capacity: Single user(s).
 9. Age Appropriateness: Five through 12 years.
- J. Freestanding Spinner, Plan Designation "K1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Spinner Bowl ELE400024-3717F" or approved equal.
1. Rotating Mechanism: Single row, permanently sealed and lubricated steel ball bearings with rubber seal.
 2. Platform: Round, PE plastic bowl with integrated metal thread bushing attachment and water drain hole.
 - a. Color: Yellow, ss selected by Designer from manufacturer's full range.
 3. Metal Frame: Hot Dipped Galvanized-steel pipe or tubing.
 4. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 5. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 6. Capacity: Single user(s).
 7. Age Appropriateness: Five through 12 years.
- K. Swing Set 3-Bay, Plan Designation "L1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Swing Frame, 6 Seat 8Ft High KSW926 with RopeNest Seat, 47-In Wide, 8Ft High SW990091-05, and Swing Seat, Stainless, 8ft High SW990011-01" or approved equal.
1. Metal Frame: Hot Dipped Galvanized-steel pipe or tubing with powder coated finish.
 - a. Leg Upright(s): Not less than 3-1/2-inch OD.
 - b. Overhead Beam: Not less than 3-1/2-inch OD.
 - c. Color: As selected by Designer from manufacturer's full range.
 2. Overhead Beam Height: 96-inches from pivot point to protective surfacing below.
 3. Suspension Members:
 - a. Short link stainless steel chain not permitting finger penetration for Swing Seat
 - b. Steel Cable core with UV stabilized PA coating for RopeNest seat
 4. Swing Connector: Stainless steel hook housed in UV stabilized housing with lifetime sealed ball bearings.
 5. Swing Hanger: Stainless steel snake-eye bolt secured through anti twist housing.

6. Swing Seats:
 - a. 1 Rope Nest Seat, 47-in wide, Polypropylene inner core with TPE rubber exterior ring with braided 16mm PES rope mesh interior. Ropes connected with Nylon Connectors.
 - 1) Color: As selected by Designer from manufacturer's full range.
 - b. 4 Swing Seats, Polypropylene inner core with TPE rubber exterior.
 - 1) Color: As selected by Designer from manufacturer's full range.
7. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
8. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
9. Arrangement: As indicated on Drawings.
10. Capacity: 1 Rope Nest swing, with 4 Standard Seat swings.
11. Age Appropriateness: Four and above for Rope Nest - Two and above for Standard Seat.
- L. Log Balance Beam, Plan Designation "M1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "Double Balance Beam NRO888 Custom" or approved equal.
 1. Frame: Single Natural Y-shaped Robinia pseudoacacia support timber and horizontal balancing timbers, sanded smooth and free of splinters or angled edges.
 2. Colors: Transparent brown pigment As selected by Engineer from manufacturer's full range.
 3. Hardware: Stainless steel frame assembly hardware as indicated by manufacturer's designations.
 4. Dimensions: 16'-1" Length x 7'-7" width x 1'-3" height.
 5. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 6. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 7. Arrangement: As indicated on Drawings.
 8. Capacity: Four users.
 9. Age Appropriateness: Five through 12 years.

2.4 COMPOSITE PLAYGROUND EQUIPMENT

- A. Custom Treehouse Play Structure, Plan Designation "N1": Basis of design product subject to compliance with requirements, provide Kompan Inc., Model "KRS8200334 Custom" or approved equal.
- B. Integral play assembly that provides more than one play activity; manufactured as a system or assembled from manufacturer's standard modular-sized units.
 1. Frame:

- a. Metal Frame – Main Structural Members: Hot dipped galvanized-steel pipe or tubing with powder coated finish connected with stainless steel bolts and fasteners.
 - 1) Main Frame Posts: Not less than 6-inch OD.
 - 2) Color: Brown, as selected by Designer from manufacturer's full range.
- b. Wooden Frame – Entry Bridge Structural Members: Robinia pseudoacacia wood support timbers, sanded smooth and free of splinters or angled edges.
 - 1) Entry Bridge Frame Posts: Not less than 6-inch OD.
 - 2) Color: Brown clear finish, as selected by Engineer from manufacturer's full range.
2. Platforms: Anodized aluminum Frame with HPL non-skid Plastic deck. Min 0.7” thick. Stainless steel fastening hardware.
 - a. Color: Brown and Tan As selected by Designer from manufacturer's full range.
3. Roofs: Anodized aluminum Frame with HPL non-skid Plastic cladding. Min 0.7” thick. Stainless steel fastening hardware.
 - a. Color: Brown and Tan As selected by Designer from manufacturer's full range.
4. Walls: Hot dipped galvanized-steel pipe or tubing with powder coated finish connected with stainless steel bolts and fasteners. HPL non-skid Plastic cladding. Min 0.7” thick. Stainless steel fastening hardware.
 - a. Color: Dark and Light Green As selected by Designer from manufacturer's full range.
5. Equipment: Include the following play event components:
 - a. Three story enclosed structure with:
 - 1) Bottom story exterior tactical panel game
 - 2) Second story steel speaking tube
 - 3) Minimum five mounted bird accent sculptures
 - 4) Bottom story enclosed interior entry space with vertical ascent/descent options and exterior viewing windows
 - 5) Accessible second story exterior deck platform with slide access
 - 6) Accessible second story enclosed interior entry space with vertical ascent/descent options and exterior viewing windows
 - 7) Third story enclosed interior space with slide access and vertical ascent/descent options and exterior viewing windows
 - b. Access, Ascent, and Descent options including:
 - 1) Rope webbing
 - 2) Climbing walls with handholds
 - 3) Vertical steel pipe ladder
 - 4) Stair platforms
 - 5) Steel fireman’s pole from second story

- 6) Third story curving plastic slide.
 - 7) Second story curving plastic slide.
 - c. Access from top of berm:
 - 1) Wooden accessible bridge.
 - 2) Membrane rope bridge
 - d. Colors: Brown and Tan platforms and framing, Dark and Light Green exterior walls, Yellow slides, as selected by Engineer from manufacturer's full range.
 - e. Hardware: Stainless steel frame assembly hardware as indicated by manufacturer's designations.
6. Dimensions: 44'-2" Length x 32'-11" width x 18'-1" height.
 7. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 8. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 9. Arrangement: As indicated on Drawings.
 10. Capacity: 20 users.
 11. Age Appropriateness: Five through 12 years.

2.5 HILLSIDE CLIMBER HALF SPHERES

- A. Hillside Climber Handholds: Basis of design product subject to compliance with requirements, provide Gorik Inc., Model "Euroflex Half Balls" in three size designations: Small (8 Balls), Medium (4 Balls), Large (5 Balls). (17 Half Balls total) or approved equal.
 1. Material: SBR granulated recycled rubber with EPDM colored rubber granulate topping, bonded with MDI Polyurethane.
 2. Overall Dimensions: 8-small half balls: min. 13.5" diameter. 4-medium half balls: min 19.5" diameter. 5-large balls: min. 29.5" diameter
 3. Colors: As selected by Designer from manufacturer's full range.
 4. Hardware: Stainless steel anchors as indicated by manufacturer's designations
 5. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 6. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 7. Arrangement: As indicated on Drawings.
 8. Capacity: N/A.
 9. Age Appropriateness: Five through 12 years.

2.6 HILLSIDE CLIMBER HANDHOLDS

- A. Hillside Climber Handholds: Basis of design product subject to compliance with requirements, provide Atomik Climbing Holds, Springville, UT 801-4-4-2080 Models "(5) Large Protons, (5) XL Hedron wide pinchers, (5) XXL Scoop Rails and (10) XL Simple Roof Jugs" (25 Handholds total) or approved equal.

1. Material: Low VOC Polyurethane Resin.
2. Colors: As selected by Designer from manufacturer's full range.
3. Hardware: Stainless steel tamper proof bolt anchors as indicated by manufacturer's designations
4. Footing Attachment: Surface mounted to concrete subbase as indicated by manufacturer's designations.
5. Footing: Poured in place concrete slope subbase as shown in Contract Drawings.
6. Arrangement: As indicated in the field by Designer
7. Capacity: N/A.
8. Age Appropriateness: Five through 12 years.

2.7 REED POSTS – ADD ALTERNATE

- A. Steel Reed Post Clusters: Basis of design product subject to compliance with requirements, provide Kompan Inc., Model “Custom Giant Reed” Two clusters of three reed posts each. (Six reed posts total) or approved equal.
1. Material: Hot dipped galvanized-steel tubing with powder coated finish connected with stainless steel bolts and fasteners.
 2. Overall Dimensions: Four - min. 6” diameter x 8’-0” height reed posts. Two – min 6” diameter x 12’-0” height reed posts.
 3. Color: Green as selected by Designer from manufacturer's full range.
 4. Hardware: Stainless steel
 5. Footing Attachment: As indicated by manufacturer's designations and as required by the delegated design under this Section.
 6. Footing(s): Poured in place concrete footings as required by the delegated design under this Section.
 7. Arrangement: As indicated on Drawings.
 8. Capacity: Six users.
 9. Age Appropriateness: One through 12 years.

2.8 FABRICATION

- A. Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with requirements in ASTM F1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, barriers, guardrails, handrails, handholds, and other components indicated or required for equipment indicated.
- B. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as required. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard drainable bottom plate or support flange. Fabricate secondary frame members, bracing, and connections from either steel, aluminum, or wood as indicated.
- C. Play Surfaces: Manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated

from composite HPL plank, with aluminum framing made into floor units with slip-resistant finish. Fabricate units in modular sizes and shapes to form assembled play surfaces indicated.

- D. Protective Barriers: Fabricate according to ASTM F1487. Extend barriers to height above the protected elevated surface according to requirements for use by age group indicated. Fabricate from one or more of the following:
 - 1. Welded-metal pipe or tubing with vertical bars.
 - 2. Vertical wood balusters with metal pipe or tubing or wood frame.
 - 3. Composite HPL panels with openings for vision and ventilation.
- E. Guardrails: Provide guardrails configured to completely surround the protected area, except for access openings. Fabricate from welded metal pipe or tubing, wood, and composite HPL panels. Extend guardrails according to requirements for use by age group indicated.
- F. Handrails: Welded metal pipe or tubing, maximum OD between 0.95 and 1.55 inches.
 - 1. Provide handrails at heights to comply with requirements for use by age group indicated according to ASTM F1487.
- G. Roofs and Canopies: Designed to discourage and minimize climbing by users.
 - 1. Fabricated from welded metal pipe or tubing, wood, and composite HPL panels.
- H. Signs: Manufacturer's standard sign panels, fabricated from opaque plastic with graphics molded in, attached to freestanding, upright support posts or directly to playground equipment.
 - 1. Text: Minimum informational content according to ASTM F1487.
 - 2. Colors: Manufacturer's designation.

2.9 MATERIALS

- A. Aluminum: Material, alloy, and temper recommended by manufacturer for type of use and finish indicated, anodized.
- B. Steel: Hot-dip galvanized with powder coat finish
- C. Stainless-Steel: Type 304; finished on exposed faces with No. 2B finish.
- D. Wood: Robina pseudoacacia, surfaced smooth on all sides and all edges rounded.
- E. Opaque Plastics: Color impregnated, UV stabilized, and mold resistant.
- F. Suspension Rope and Fittings: Steel Cable core with UV stabilized PA coating. Stainless steel frame attachment hardware as indicated by manufacturer's designations.
- G. Post Caps: Hot-dip galvanized steel with powder coat finish; color to match posts.
- H. Platform Clamps and Hangers: zinc-plated steel, not less than 0.105-inch-nominal thickness.

- I. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel, vandal-resistant design.
- J. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or zinc-plated steel; permanently capped; and theft resistant.

2.10 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment: Pressure-treat wood products according to AWWA U1 and the following:
 - 1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.11 CAST-IN-PLACE CONCRETE

- A. Concrete and Reinforcing Steel Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete."

2.12 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils, medium gloss. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 80 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

2.13 STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for pretreatment, applying, and baking.
- B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 100 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

2.14 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Concrete foundation: Comply with Section 033000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, testing, and placing concrete. Place on compacted subgrade as specified in Division 31.
- B. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
 - 1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
- C. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
- D. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
- A. Post Set with Concrete Footing: Comply with Section 033000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.
 - 1. Set equipment posts on concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.

- a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
2. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
3. Finishing Footings: Smooth top, and shape to shed water.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
 1. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487.
- C. Playground equipment items will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Notify Designer 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 116800

SECTION 260510 – LIMITED ELECTRICAL FOR SMALL PROJECTS

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. Copper power and control wire rated 600V or less.
2. Connectors, splices, and terminations.
3. Grounding and bonding components.
4. Support systems for raceways, boxes, and electrical equipment.
5. Metal conduits and fittings.
6. Nonmetallic conduit and fittings.
7. Boxes, enclosures, and cabinets.
8. Handholes and boxes for exterior underground cabling.
9. Identification requirements.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit. See also RAC.
- B. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.
- C. Duct: A single duct or multiple ducts. Duct may be installed singly or as a component of a duct bank.
- D. Duct Bank:
 1. Two or more ducts installed in parallel, with or without additional casing materials.
 2. Multiple duct banks.
- E. EMI: Electromagnetic interference.
- F. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50V or for remote-control and signaling power-limited circuits.
- G. RAC: Rigid aluminum conduit. See also ARC.
- H. RoHS: Restriction of Hazardous Substances.

- I. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.
- J. National Electrical Code (NEC) / NFPA conduit types:
 - 1. RMC – rigid metal conduit
 - 2. FMC – flexible metal conduit
 - 3. LFMC – liquidtight flexible metal conduit
 - 4. PVC – rigid polyvinyl chloride conduit
 - 5. RNC – rigid nonmetallic conduit

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product used on this project.
- B. Installation Working Drawings: For underground conduit routing.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 ELECTRICAL MATERIALS

- A. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with associated UL Standards as applicable and listed in this specification.

2.2 WIRE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Alpha Wire Company.
 - 2. Encore Wire Corporations.
 - 3. General Cable Technologies Corporation.
 - 4. Okonite Company (The).
 - 5. Service Wire Co.
 - 6. Southwire Company.
- B. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V.
- C. Standards:
 - 1. RoHS compliant.

- 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Size: Minimum No. 12 AWG for power circuits, minimum No. 14 AWG for control circuits.
- F. Stranding: Refer to Part 3 "Conductor Applications" Article.
- G. Conductor Insulation: Refer to Part 3 "Conductor Applications" Article.
 - 1. Type THHN and Type THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.

2.3 CONNECTORS, SPLICES, AND TERMINATIONS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. 3M Electrical Products.
 - 2. Ideal Industries, Inc.
 - 3. TE Connectivity Ltd.
 - 4. Thomas & Betts Corporation; A Member of the ABB Group.
- B. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Tin-plated copper.
 - 2. Type:
 - a. Locking spade with insulated sleeve for No. 10 AWG and smaller.
 - b. One hole with long barrels for No. 8 AWG to No. 4/0 AWG.
 - c. Two holes with long barrels for 250 kcmil and larger.
 - 3. Termination: Compression for No. 8 AWG and larger.
- D. Connectors:
 - 1. Solderless pressure type (wirenuts) for No. 10 AWG and smaller.
 - 2. Pre-filled with silicone-based sealant for exterior, wet, or corrosive locations.
 - 3. Split bolt type for No. 8 AWG and larger splices.
- E. Motor Terminations: Mechanical compression ring type, secured with bolt, nut, and spring washer. Insulated with Raychem type RVC, roll-on stub insulator or equal.

2.4 GROUNDING AND BONDING MATERIALS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ERICO; a brand of nVent.
 - 2. Hubbell Incorporated (Construction and Energy Group).
 - 3. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 4. Thomas & Betts Corporation; A Member of the ABB Group.
- B. Standard: Comply with UL 467 for grounding and bonding materials and equipment.
- C. Grounding Conductors:
 - 1. Insulated conductors to match corresponding 600V phase conductor insulation requirements.
 - 2. Bare copper conductors: tin-plated.
- D. Ground rods: Copper-clad steel, sectional type; 3/4-inch diameter by 10-foot; minimum copper thickness 0.25 mm (10 mil).
- E. Grounding conduit hubs: Malleable iron type, mechanical type, terminal with threaded hub, sized for the associated conduit.
- F. Waterpipe ground clamps: cast bronze saddle type, sized for the associated water pipe.
- G. Exothermic weld: CADWELD process, or equal. Molds and powder furnished by same manufacturer and selected for specific combination of conductors and connected items. Use low emission type, CADWELD EXOLON or equal for welds used indoors in occupied buildings or confined spaces.

2.5 SUPPORT SYSTEMS

- A. Aluminum Channel:
 - 1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 2. Channel Material: 6063-T5 aluminum alloy.
 - 3. Fittings and Accessories Material: 5052-H32 aluminum alloy.
- B. Accessories: conduit clamps, straps, hangers, rods, backplates, anchors, nuts, washers, etc. shall match channel material as listed in the SUPPORT MATERIALS APPLICATION Article. Use of galvanized steel components is only allow with galvanized steel channel.
- C. Threaded rod: 3/8-inch minimum diameter.
- D. Expansion anchors: 3/8-inch minimum diameter.

2.6 METAL CONDUITS AND FITTINGS

- A. Rigid Aluminum Conduit: Comply with ANSI C80.5 and UL 6A.

- B. LFMC: Sealtite®, Type UA, continuously interlocked flexible steel conduit with sunlight and chemical resistant PVC jacket and complying with UL 360.
- C. FMC: Comply with UL 1; zinc-coated steel.
- D. Metallic Fittings: Comply with NEMA FB 1 and UL 514B.
 - 1. Use cast aluminum fittings with RAC.
 - 2. Use malleable iron, three-piece screw in type with LMFC.
 - 3. Use Myers Electric Products, Inc. or equal, grounding type for conduit hubs.

2.7 NONMETALLIC CONDUIT AND FITTINGS

- A. RNC: Schedule 40 or Schedule 80 PVC based on application; comply with NEMA TC 2 and UL 651.
- B. LFNC-B: Comply with UL 1660, Type B.
- C. Nonmetallic Fittings:
 - 1. RNC: Comply with NEMA TC 3; match conduit type and material.
 - 2. LFNC: Comply with UL 514B; dust-tight, liquid-tight, chemical resistant thermoplastic/nylon construction with tapered thread hub and neoprene O-ring gasket. Push-on fittings are prohibited.
- D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.8 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: Pressed steel. Comply with NEMA OS 1 and UL 514A.
- B. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- D. NEMA 1 and NEMA 12 Pull and Junction Boxes:
 - 1. Material: Sheet steel, minimum 14 gauge, without knockouts.
 - 2. Construction: flanged box, galvanized with continuous weld seams that are ground smooth.
 - 3. Cover: Gasketed, hanged, fastened with quick connect door clamp.
- E. NEMA 4X Pull and Junction Boxes:
 - 1. Material: Type 316 stainless steel, minimum 14 gauge, without knockouts.
 - 2. Construction: flanged box, continuous weld seams that are ground smooth.
 - 3. Cover: Gasketed, hanged, fastened with quick connect door clamp.

- F. NEMA 7/4 Pull and Junction Boxes: When Drawings classify the area for Class 1, Division 1, Group D hazardous area, cast aluminum with stainless steel bolts; Type EJB-N4 as manufactured by Crouse Hinds or equal.
- G. Handholes and Boxes for Exterior Underground Cabling: Comply with details as indicated on the Drawings.

2.9 IDENTIFICATION

- A. Factory applied insulation color for No. 8 AWG conductors and smaller. Factory applied insulation color or field applied colored electrical tape for No. 6 AWG conductors and larger:
 - 1. Color for 240/120V Circuits (Single Phase):
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Neutral: White.
 - 2. Color for Equipment Grounds: Green.
 - 3. Color of Individual Control Conductors:
 - a. AC: Red.
 - b. DC: Blue.
- B. Nameplates and Labels:
 - 1. Equipment Identification and Source Nameplates:
 - a. Black letters on a white field.
 - b. Engraved, laminated plastic, 3/16-inch-high lettering.
 - c. Provide for all electrical equipment. Match Drawing designation.
 - d. Include power source information, i.e., "FED FROM MCC-2" or provide separate nameplate.
 - 2. Device Identification Labels:
 - a. Black letters on a white field.
 - b. Machine generated, self-adhesive, 1/4-inch-high lettering.
 - c. Provide for all receptacles, wall switching, lighting fixtures, photocells, exit lights, instruments, etc.
 - d. Include power source and branch circuit information, i.e., "LP-2/15" indicates panelboard LP-2, branch circuit 15.
 - 3. Wire and Cable Labels:
 - a. Black letters on a white field.
 - b. Wraparound or sleeve type.
- C. Detectable Underground-Line Warning Tape:
 - 1. Foil-backed, detectable buried utility tape with black lettering on a bright background.
 - 2. Width: 6 inches.

3. Overall Thickness: 5 mils.
4. Background Color / Description:
 - a. Red / Electric: electrical power, control, or instrumentation.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the applicable National Electrical Contractors Association (NECA) documents for installation requirements except where requirement on Drawings or in this specification are stricter.
 1. NECA 1: Standard for Good Workmanship in Electrical Construction.
 2. NECA 101: Standard for Installing Steel Conduits.
 3. NECA 102: Standard for Installing Aluminum Rigid Metal Conduit.
 4. NECA 111: Standard for Installing Nonmetallic Raceways.
 5. NECA 331: Standard for Installing Building and Service Entrance Grounding and Bonding.

3.2 CONDUCTOR APPLICATIONS

- A. Wires and Cables: Copper, stranded, except for lighting and receptacle wiring which may be solid.
- B. Wire for lighting, receptacles, and other circuits not exceeding 150 volts to ground shall be NEC type THWN-2/THHN. Below grade and underground the wire shall be type XHHW-2.
- C. Wire for power circuits over 150 volts to ground shall be NEC type XHHW-2 for sizes No. 4/0 AWG and smaller, and shall be NEC type RHW-2 for sizes 250 kcmil and larger.
- D. Equipment grounding conductors shall be the same NEC type as the phase conductors described previously, green and sized per NEC Table 250.122.
- E. Bare copper ground wire shall be stranded, tinned soft drawn annealed copper wire.
- F. Ground grid conductors shall be uninsulated unless shown otherwise on the Drawings.
- G. Wire for control, status, and alarm shall be NEC type THWN-2/THHN.

3.3 CONDUCTOR INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points prior to pulling conductors and cables.

- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Use of steel fish tapes and/or steel pulling cables in PVC conduit or raceways that terminate into energized enclosures is prohibited.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Adequately support cables.
- G. 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.
- H. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors. Do not splice service or feeder cables without prior written approval of Engineer. Instrumentation and Ethernet cables may not be spliced and shall be continuous from terminal to terminal.
- I. Wiring at Outlets:
 - 1. Install conductor at each outlet, with at least 6 inches of slack.
 - 2. Form solid wire into loop to fit around device terminal screw. Do not overlap wire.
- J. Identify and color-code conductors and cables.
- K. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.
- L. Identify circuit number associated with lights, receptacles, and other miscellaneous loads to panelboards. Identify phase and neutral conductors with circuit number.
- M. Install instrumentation and Ethernet cabling in separate raceway from control or power wiring.
- N. Separation from EMI Sources:
 - 1. Separation between open instrumentation cables or cables in non-metallic or non-ferrous raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Equipment or circuits rated less than 2 kVA: Minimum 5 inches.
 - b. Equipment or circuits rated between 2 and 5 kVA: Minimum 12 inches.
 - c. Equipment or circuits rated more than 5 kVA: Minimum 24 inches.

3.4 GROUNDING

- A. Comply with NEC Article 250.

- B. Install insulated green equipment grounding conductor in all power and control raceways.
- C. For instrumentation wiring, ground shield at one end only as recommended by instrument manufacturer and in accordance with Owner's standard.
- D. Install grounding conductors in conduit or sleeves when passing through floor slabs.
- E. Use exothermic welding process for all underground connections, connections to structural steel, connections to ground rods, or other connections which will become inaccessible at project completion.

3.5 SUPPORT MATERIALS APPLICATION

- A. Dry, indoor, conditioned, non-process space: Hot-dipped galvanized steel.
- B. Outdoor, process areas, or areas shown on the drawings as "DUST", "DAMP", or "WET": Aluminum and/or stainless-steel channel, depending upon load requirements.
- C. Areas shown on the drawings as "CORROSIVE": Nonmetallic.

3.6 RACEWAY APPLICATIONS

- A. Refer to Appendix Table 260510-1 for specific raceway application requirements.
- B. Minimum Raceway Size: 3/4-inch trade size.

3.7 BOX APPLICATIONS

- A. All boxes shall be metallic unless specified herein or indicated on the Drawings.
- B. Use cast malleable iron for boxes and conduit fittings for exposed switch, receptacle, and lighting outlets.
- C. Use pressed steel boxes for concealed switch, receptacles, and lighting outlets.
- D. Pull boxes, junction boxes, cabinets, etc. shall be suitable for the location and conform to the NEMA enclosure rating and material descriptions as indicated on the Drawings.
- E. Where no size is indicated for junction boxes, pull boxes, or terminal cabinets, size in accordance with NEC Article 314.

3.8 RACEWAY INSTALLATIONS

- A. Complete raceway installation before starting conductor installation.
- B. Tightly plug ends of conduits during construction to exclude dust and moisture.
- C. Arrange stub-ups so curved portions of bends are not visible above finished slab.

- D. Arrange conduit system to allow liquids such as water, condensation, etc. will drain away from equipment served. If conduit drainage is not possible, plug conduits using conduit seals.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run. Support within 12 inches of changes in direction.
- F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- 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. Install Meyers grounding type hubs when conduits terminate at gasketed enclosures.
- 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. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways using "Duxseal" or seal fitting at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.

4. Conduit extending into pressurized duct and equipment.
 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 6. Where otherwise required by NFPA 70.
- Q. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- R. Install expansion joint fittings where necessary to compensate for thermal expansion and contraction.
- S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission or movement; and for transformers and motors.
- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- U. A maximum continuous run of conduit shall not exceed 300 feet and shall be reduced by 75 feet for each 90-degree elbow.
- V. Provide a 4-inch concrete housekeeping pad at all slab and grade penetrations. Provide a 45 degree, 3/4-inch chamfer at all exposed edges.
- W. Protect metallic finish conduit installed in contact with concrete or below grade with two coats of bitumastic paint, heat shrink tubing, or approved equivalent. Extend protection on riser conduits from 12 inches below slab to 6 inches above slab.
- X. In hazardous locations, seal conduits terminating at boxes enclosing circuit opening equipment at the entrance to the enclosure with approved compound filled sealing fittings to prevent passage of explosive or combustible gases through the conduits. Similarly seal all conduits leading from or entering hazardous locations at points of exit or entrance. Seal exposed conduits passing through hazardous locations at both the entrance to and the exit from the hazardous locations.
- Y. Install conduit sealing and drain fittings in all hazardous (classified) areas designated Class 1, Division 1, and Class 1, Division 2.

3.9 UNDERGROUND SYSTEM INSTALLATION

- A. Coordinate final arrangement with other underground utilities, site grading, and surface features.
- B. Comply with Division 31 specifications for earthwork, excavation, trenching, backfill, and compaction.
- C. Raceway Drainage:
1. Drain away from buildings.
 2. Drain towards manholes or handholes.

- 3. Slope raceway not less than 3-inches per 100-feet.
- D. Restoration: Restore surface features and re-establish grade, paving, and vegetation to original unless otherwise indicated.
- E. Separate underground copper signal conduits (instrumentation and telecommunication) from power conduits by a minimum of 12 inches unless noted otherwise. Keep crossing of these conduits to a minimum; cross at 90-degree angles.
- F. Transition to Metal Conduit:
 - 1. Use fittings manufactured for RNC to metal conduit transition.
 - 2. Make transition from underground duct to metal conduit at least 10 feet outside the building wall, without reducing duct line slope away from building and without forming a trap in the line.
- G. Minimum Cover and Additional Detail: As indicated per details on Drawings.
- H. Where Drawings call for concrete encased duct bank, color concrete red.

3.10 ELECTRICAL PENETRATIONS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc.
- B. Locate all slots and concealed conduits and stub-ups for electrical work and place and form as required before concrete is poured.
- C. Make weathertight and restore finishes on exterior penetrations.
- D. Use conduit wall seals where underground conduits penetrate walls or at other locations indicated on the Drawings.
- E. Seal openings where conduits pass through walls or floors to prevent passage of flame and smoke. Maintain fire rating of walls.
- F. Patch and paint interior wall penetrations to match original.

3.11 IDENTIFICATION INSTALLATION

- A. Self-Adhesive Identification Products: Before applying identification product, prepare and clean attachment surface with manufacturer recommended product to allow for effective bond.
- B. Verify and coordinate identification names and other features.
- C. Nameplate Attachment:
 - 1. Screw mounted for NEMA 1 enclosures.
 - 2. Epoxy or similar waterproof adhesive for all other enclosure types.

- D. Install identification and power source nameplates for electrical equipment. Refer to Part 2 “Identification” Article for requirements.
- E. Install circuit identification labels for cables and conductors at each termination location and within pull boxes and handholes. Refer to PART 2 “Identification” Article for color code and additional requirements.
- F. Install device identification labels for receptacles, light switches, etc. Refer to Part 2 “Identification” Article for requirements.
- G. Install underground warning tape during backfilling of trenches for underground conduits and duct banks in accordance with details on the Drawings.
- H. Panelboard Identification
 - 1. Provide equipment and power source nameplates as previously described.
 - 2. Label branch circuit phase and neutral wires with associated pole number.
 - 3. Install typed as built circuit directory giving location and nature of load served.

3.12 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections for conductors and cables.
 - 1. Visually inspect for correct installation.
 - 2. Perform continuity test.
 - 3. Perform insulation-resistance test for power and control conductors in accordance with NETA standards.
 - 4. Verify uniform resistance of parallel conductors.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Conduct fall-of-potential grounding electrode system test in accordance with IEEE 81.
- D. Prepare test and inspection reports.

3.13 CLEANING / PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration. Repair damage as recommended by manufacturer.
- B. Remove all rubbish and construction debris from inside electrical equipment and enclosures.

3.14 APPENDICES

- A. Table 260510-1: Raceway Application Guidelines

Table 260510-1 Raceway Application Guidelines
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Raceway Type	Location / Application
Galvanized Rigid Steel (GRC)	<p>All indoor and outdoor applications, except where other types are listed.</p> <p>All exposed, non-corrosive areas.</p> <p>All concealed, non-corrosive areas.</p> <p>Under slabs in slab on grade construction.</p> <p>Stub-ups through slabs.</p> <p>Hazardous areas</p> <p>Use LFMC for flexible connections.</p> <p>When installed underground or in contact with concrete, paint with two coats of bitumastic paint.</p>

END OF SECTION 260510

SECTION 310515 - SOILS AND AGGREGATES FOR EARTHWORK

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. Soils: Soil materials.
 - 2. Aggregates: Coarse aggregate materials and fine aggregate materials.
- B. Related Sections:
 - 1. Section 312000 "Earthwork."
 - 2. Section 329113 "Soil Preparation"
 - 3. Section 329200 "Turf and Grasses"

1.3 INFORMATIONAL SUBMITTALS

- A. Materials Source: Submit name and location of imported materials suppliers.
- B. Source's Certificate: Certify materials meet or exceed specified requirements.
- C. Material Test Reports: For each borrow soil and aggregate material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D 2487.
 - 2. Laboratory compaction curve according to ASTM D 1557.
 - 3. Test Reports: Submit any test reports required by this Section to the Engineer.
- D. Test Results: Submit test results are required by Article "Source Quality Control."

1.4 QUALITY ASSURANCE

- A. Furnish each subsoil and topsoil material from single source throughout the Work, unless an alternate source is approved by the Engineer.
- B. Furnish each coarse and fine aggregate material from single source throughout the Work, unless an alternate source is approved by the Engineer.
- C. Perform Work according to of MASSDOT standards.

- D. Quality Control and Quality Assurance consists of laboratory conformance testing of samples supplied from each coarse and fine aggregate source and quality control during installation.
 - 1. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.5 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Common Fill: On site excavated material or imported fill material that is composed of durable soil free of debris, organic matter, or other deleterious materials and consisting of well-graded granular soil free from organic material, loam, debris, frozen soil, or other deleterious material, free of stones larger than 2 inches in largest diameter, and a maximum of 20 percent passing the No. 200 sieve, not containing granite blocks, broken concrete, masonry rubble, or other similar materials and shall have physical properties such that it can be readily spread and compacted during filling.
- A. Structural Fill – Structural fill shall consist of granular mineral soil free of organic material, loam, debris, frozen soil or other deleterious material which may be compressible, or which cannot be properly compacted. Structural fill shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
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3-in	100
No. 4	20 to 70
No. 40	5 to 35
No. 200	0 to 10

2.2 TOPSOIL MATERIALS

- A. Topsoil :
 - 1. Imported borrow and amended existing topsoil. See Section 329113 “Soil Preparation”.

2.3 COARSE AGGREGATE MATERIALS

- A. Coarse Aggregate - Crushed Stone: Natural stone; free of clay, shale, organic matter; conforming to of MASSDOT standard.
 - 1. Coarse Aggregate Designation: M2.01.4.
- B. Coarse Aggregate – Dense Graded Crushed Stone: Natural stone; free of clay, shale, organic matter; conforming to MASSDOT standard.
 - 1. Dense Graded Crushed Stone Designation: M2.01.7
- C. Coarse Aggregate – Sandy Gravel Fill: Blend of sand and crushed stone consisting of hard, durable, rounded or sub-angular particles; free from loam, clay, excess fines and deleterious materials, conforming to MASSDOT standard.
 - 1. Sandy Gravel Fill Designation: M1.04 Type B
- D. Coarse Aggregate – Processed Gravel: Natural stone; free of clay, shale, organic matter; conforming to MASSDOT standard.
 - 1. Processed Gravel Designation: M1.03.1
- E. Coarse Aggregate - Screened Gravel: Natural stone; hard, durable, rounded, or sub-angular particles of proper size and gradation, and shall be free from sand, loam, clay, excess fines, and other deleterious materials; to the following limits:
 - 1. Percent Passing per Sieve Size:
 - a. 5/8- inch: 100 percent.
 - b. 1/2-inch: 40 to 100 percent.
 - c. 3/8-inch: 15 to 45 percent.
 - d. No. 10 : 0 to 5 percent.

2.4 FINE AGGREGATE MATERIALS

- A. Fine Aggregate - Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter; graded according to ASTM C 33; within the following limits:
 - 1. Percent Passing per Sieve Size:
 - a. No. 4: 95 to 100.
 - b. No. 8: 80 to 100.
 - c. No. 16: 50 to 85.
 - d. No. 30: 25 to 60.
 - e. No. 50: 10 to 30.
 - f. No. 100: 2 to 10.

2.5 SOURCE QUALITY CONTROL

- A. Quality Requirements: Testing and inspection services. Submit test result reports to the Engineer.
- B. When tests indicate materials do not meet specified requirements, change material and retest.
- C. Furnish materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile topsoil 8 feet high maximum.
- C. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION 310515

SECTION 311000 - SITE CLEARING

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. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Removing above- and below-grade site improvements.
5. Disconnecting, capping or sealing, and removing site utilities and abandoning site utilities in place.
6. Temporary erosion and sedimentation control.
7. Temporary fencing

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with MASSDOT standards.

1.8 FIELD 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 Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed roadways if required by Owner or authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify Dig Safe System, Inc. for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earthwork."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

2.2 STRAW WATTLE

- A. Straw Wattle: Prefabricated commercial product with outside casing made up of organic hessin
 - 1. Effective Height: 12 inches plus or minus 1 inch
 - 2. Effective Circumference: 38 inches.
- B. Product: Provide products by Phase II Stormwater Products, Wrentham, MA or equal.

2.3 SILTATION CONTROL DEVICES FOR CATCH BASINS

- A. Where directed by the Engineer, use a siltation control device to trap sediment and prevent the drainage system from clogging. Install siltation control device(s) between the catch basin frame and grate. Clean and maintain the siltation control device(s) on a regular basis and as directed by the Engineer.
- B. Provide the siltation control device consisting of a woven sack that is sewn with a double needle machine using high strength thread.
- C. Manufacture the siltation control device to fit the opening of the catch basin or drop inlet. The siltation control device will have the following features; two dump straps attached to the bottom of the sack to facilitate the dumping of the trapped sediment. The top of the siltation control device shall have lifting loops as an integral part of the sack to be used to lift the partially fill sack out to empty. The siltation control device shall have a restraining strap approximately halfway up the sack to keep the sides away from the catch basin walls. This yellow strap is a visual means of determining when the sack needs to be emptied. Once the strap is covered with sediment, the siltation control device should be emptied, cleaned and placed back in the catch basin.
- D. Geotextile Fabric: Woven fabric with the following properties:

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>TEST RESULT</u>
Grab Tensile	ASTM D4632	265 lbs.
Grab Elongation	ASTM D4532	20 percent
Puncture	ASTM D4833	135 lbs.
Mullen Burst	ASTM D1-3786	420 P.S.I.
Trapezoidal Tear	ASTM D4533	45 lbs.
UV Resistance	ASTM D4355	90 percent
Apparent Opening Size	ASTM D4751	20 US Sieve
Flow Rate	ASTM D4491	200 gal/min/sf
Permittivity	ASTM D4491	1.5 sec ⁻¹
Average Strength	ASTM D4884	100 lb/in

- E. Siltation Control Devices: SILTSACK, manufactured by ACF Environmental, Inc. or approved equal.

2.4 TEMPORARY FENCING

- A. Fabric: No. 9 gauge galvanized wire woven in 2-in diamond mesh with top and bottom twisted selvage.
- B. Posts:
1. Intermediate and Terminal Posts: Galvanized steel H or pipe.
 2. Line Posts: minimum 2-3/8 in OD
 3. Corner and Pull Post: 2-7/8 in OD
 4. Top Rails: 1-5/8 in OD
- C. Foundations: Provide portable concrete surface foundations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain have been flagged.
- C. Protect existing site improvements to remain from damage during construction.
1. Restore damaged improvements to their original condition, as acceptable to Owner.
- D. Call Dig Safe System, Inc. not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. 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 erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 STRAW WATTLE

- A. Position straw waddles as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
- B. Drive wooden stakes, 5 feet on center (maximum) at back edge of waddle. Drive stakes 2 feet into ground.
- C. Install pre-fabricated straw waddle according to manufacturer's instructions.

3.4 TREE AND PLANT PROTECTION

- A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

3.5 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.6 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.7 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.8 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove: slabs, paving, concrete curb, tennis nets, posts, and footings; basketball posts and footings, fence fabric, posts, and footings, light posts, foundations and conduit and aggregate base as required to accommodate new construction.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.9 TEMPORARY FENCE

A. Temporary fence for site security

1. 6-foot high chain link fence.
2. Gates equipped with locking hardware and padlocks. Two sets of keys.
3. Comply with ASTM F567.
4. Post spacing; 8-foot O.C. minimum
5. Daily inspection and immediate repair or replacement of damaged or compromised components.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- #### A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

3.11 REMOVAL AND RESTORATION

- #### A. Remove temporary facility complete when need for service has ended.
- #### B. Coordinate removal with authorities having jurisdiction.

END OF SECTION 311000

SECTION 312000 - EARTHWORK

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. General: Earthwork includes clearing and stripping, procurement of on-site and imported fill material, excavating, placing, and compacting fill and backfill, structural excavating and backfilling, transportation and storage of excess earthwork materials; disposal of unsuitable, waste, and surplus materials; restoration of excavation and trench surfaces; and subsidiary work necessary to complete the grading of developed areas to conform with required lines, grades, and slopes.
- B. Work includes, but is not necessarily limited to; excavation for structures, foundations, manholes, vaults, electrical manholes, conduits, cables, raceways and ducts, pipes, paving; embankments; grading; and related work such as sheeting, bracing and dewatering.
- C. Provide services of a licensed Professional Engineer to prepare temporary excavation support system, dewatering system designs, and submittals.
- D. Provide temporary excavation support systems, including sheeting, shoring, and bracing, to ensure the safety of personnel and protect adjacent structures, piping, and other materials in accordance with Federal, State and local laws, regulations, and requirements.
- E. Provide temporary dewatering, surface water control systems, and operate to dewater and maintain excavations in a dry condition. Control drainage into excavations and remove seepage water and rainwater.
- F. Examine site and review available site information prior to submitting a proposal, taking into consideration project conditions that may affect the work. Owner and Design Engineer do not assume responsibility for variations of subsurface conditions at locations other than places shown and at the time investigations were made.
- G. Do not initiate extra work without written notification to Owner and Engineer and receiving Owner's written approval in response.
- H. Protect existing structures and utilities that remain.
- I. Related Requirements:
 - 1. 310515 "Soils and Aggregates for Earthwork" for fill materials.

2. Section 311000 "Site Clearing" for site preparation work, including stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 312500 "Erosion and Sedimentation Controls" for temporary stated work.
4. Section 321216 "Asphalt Paving" for flexible paving system.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- C. Coverage: Pass of compaction equipment over the complete surface area of exposed lift or subgrade to receive compaction.
- D. 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 Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Unauthorized Additional Excavation: Excavation as directed by Engineer to correct Contractor's work not in compliance with Contract Documents, which will be performed without additional compensation.
 3. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 4. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be provided without additional compensation.
- E. Finished Grade: Required final grade elevation indicated on Drawings. Spot elevations take precedent over proposed contours.
- F. In-the-Dry: An excavation subgrade where groundwater level: has been lowered to at least 2 feet below lowest level of excavation; is stable with no ponded water, mud, or muck; is able to support construction equipment without rutting or disturbance; and is suitable for placement and compaction of fill material, pipe, or concrete foundations.
- G. Objectionable Material: Includes topsoil, organic matter, contaminated soil, construction debris, perishable materials, snow, ice, frozen earth, and rocks or lumps of cemented soils over 6 inches in maximum dimension.
- H. Optimum Moisture Content: Moisture content (percent by dry weight) corresponding to maximum dry density of the same material as determined by ASTM Test Method D1557.

- I. Overexcavation: Removal of unsuitable soil or objectionable material at or below the normal grade of excavation or subgrade as indicated on Drawings.
- J. Percent Compaction: Required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material, as determined in the laboratory by ASTM Test Method D1557.
- K. Structures: Buildings, wet wells, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, manholes and vaults, or other man-made stationary features constructed above or below the ground surface.
- L. Subgrade: Required surface of subsoil, borrow fill, or compacted fill that is immediately beneath site improvements, especially dimensioned fill, paving, or other surfacing material.
- M. Unsuitable Soil: Includes existing fill materials, organic soils, weak native soils, or clays with a plasticity index of greater than 30, and any materials that cannot be properly placed and compacted as specified.
- N. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- O. Zone of Influence: A line extending at least 2 feet beyond foundation or pipeline edge, then outward and downward at a slope of 1 horizontal to 1 vertical. Do no excavation below foundation of existing structures or pipeline.
- P. Professional Engineer: Registered Professional Engineer meeting project qualifications and who is hired by Contractor.
- Q. The Engineer: The Engineer or designated representative hired by Owner.
 - 1. Approval given by The Engineer shall not relieve Contractor of its responsibilities for performing the work in accordance with Contract Document requirements.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct pre-excavation conference at Project site .
 - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

1.5 ACTION SUBMITTALS

- A. Coordinate various submittal types required by this Section with requirements of dewatering, support of excavation, and rock removal submittals specified in other Sections.
- B. Slope Stability Evaluation: Submit a temporary excavation slope stability evaluation in accordance with OSHA for temporary slopes over 20 feet in height or where existing or proposed facilities or property limits are located at the top of the slope and within a distance from the top of the slope equal to the slope height.
 - 1. Prepare evaluation by a licensed Professional Engineer registered in the Commonwealth of Massachusetts.
- C. Site Characterization Data: Submit following information regarding off-site source and material:
 - 1. Site location.
 - 2. Present and past usage of the source site and material.
 - 3. Previously existing reports associated with an assessment of source site relating to presence of oil or other hazardous materials.
 - 4. Location within the site from which the material will be obtained.
- D. Samples: Submit a representative sample weighing approximately 50 pounds of each fill material, filter sand, and crushed stone contained in sealed 5 gallon containers, at least 30 calendar days prior to date of anticipated use of each material.
- E. Submit laboratory test results for fill materials that include maximum density, gradation, Atterberg limits, sand equivalent, and other applicable criteria, at least 72 hours prior to importing or placing fill.
- F. Prepare excavation support system designs by a licensed Professional Engineer, registered in Commonwealth of Massachusetts in which the work is located and having a minimum of 5 years of professional experience in design and construction of excavation support systems.
 - 1. Submit an original and three copies of licensed Professional Engineer's certification stating excavation support systems designs have been prepared by Professional Engineer who is responsible for their execution.

1.6 INFORMATIONAL SUBMITTALS

- A. Construction and Operations Plan: Submit proposed methods of construction, including earthwork operations, excavation limits, slopes, fill material moisture conditioning and handling, compaction equipment, excavation support systems designs, backfilling and filling and compaction, and material sources.
- B. Submit copies of field daily reports by soil technician at the end of each work day that earthwork and grading operations occur.

- C. Upon completion of earthwork and grading operations, submit an as-graded map showing density test numbers and locations, a table of density test results and depths, and a certification of compliance by geotechnical engineer in charge.
- D. Qualification Data: For qualified testing agency to conduct geotechnical observation, testing and documentation. include qualifications of firm, resumes of soil technicians assigned to the project, and licensed geotechnical engineer in charge.
 - 1. Firm Qualifications: Meet ASTM D3740.
 - 2. Soil Technicians: Have minimum three years demonstrated experience in earthwork and grading operations and satisfy certification requirements of agency having local jurisdiction.
 - a. The Engineer reserves right to request substitution of soil technicians assigned to field work. Do not substitute assigned soil technicians without prior approval of The Engineer.
- E. Pre-excavation Photographs or 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.

1.7 QUALITY ASSURANCE

- A. Excavation, trenching, sheeting, bracing, and similar work shall comply with requirements of OSHA excavation safety standards, 29 CFR Part 1926 Subpart P, and to the Massachusetts Department of Labor and Workforce Development, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations" (Chapter 454 CMR 10.00 et seq)., and State and local authorities having jurisdiction. Where conflict between OSHA, State and local regulations exists, apply most stringent requirements.
- B. At least three working days prior to starting any excavation, notify the appropriate regional notification center for underground utilities and underground utility owners who are not members of notification center. To obtain area specific information for project site, refer to [www.call 811.com](http://www.call811.com).
- C. Quality Control Testing for Off-site Borrow Materials:
 - 1. Chemical testing will not be required where site characterization of off-site borrow sources indicates that soils are acceptable for use. If site characterization data or materials are suspected of being contaminated, perform chemical testing as directed by The Engineer with no additional compensation.
 - 2. Chemical Test Data: Test each material source requiring testing by a person experienced in sample collection who is a registered Professional Engineer or geologist or certified groundwater or environmental professional registered in the Commonwealth of Massachusetts. Submit samples of each proposed material to a chemical analytical laboratory, certified by the governing agency, for following analyses:
 - a. Volatile Organic Compounds: EPA 8240 plus Hazardous Substance List (HSL) Parameters.
 - b. Acid and Base Neutral Extractable Organic Compounds: EPA 8270.

- c. Pesticides and PCBs: EPA 8080.
 - d. Total Petroleum Hydrocarbons: Infrared Method, EPA 9071/418.1.
 - e. Thirteen Priority Pollutant Metals: EPA 7000 Series.
 - f. Total Cyanide: EPA 9012.
3. Obtain and test off-site borrow samples in accordance with criteria established by The Engineer. Submit results for review and approval prior to use on site.

1.8 FIELD CONDITIONS

- A. Be responsible for construction layout and reference staking necessary for proper control and satisfactory completion of structures, cutting, filling, grading, drainage, fencing, embankment improvements, curbing, and other appurtenances.
- B. Perform construction layout and staking by a Professional Surveyor or Professional Engineer registered in Commonwealth of Massachusetts, experienced and skilled in construction layout and staking requirements.
- C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earthwork operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- D. Improvements on Adjoining Property: Authority for performing earthwork indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Do not proceed with work on adjoining property until directed by The Engineer.
- E. Utility Locator Service: Notify "Dig Safe System" for area where Project is located before beginning earthwork operations.
- F. Do not commence earthwork operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 "Site Clearing" are in place.
- G. Do not commence earthwork operations until plant-protection measures specified in Section 015000 "Temporary Facilities and Controls" are in place.
- H. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

- I. Do not direct vehicle or equipment exhaust towards protection zones.
- J. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Fill materials designated for use in this Section are specified in Section 310515 “Soils and Aggregates for Earthwork.”
- B. On-Site Fill Material: Earth and rock material obtained at project site during excavation, following clearing and stripping, from which any Unsuitable Soil or Objectionable Material has been removed.
- C. General: Provide imported fill materials when sufficient satisfactory soil materials are not available from excavations.

2.2 GEOTEXTILE FILTER FABRIC

- A. Non-woven Filter Fabric shall be Mirafi, Type 1100N, or equal product and shall conform to the following requirements:
- B. Minimum Grab Tensile Strength of 250 lbs per ASTM D4632.
- C. Minimum Trapezoid Tear Strength of 100 lbs per ASTM D4533.
- D. CBR Puncture Strength of 700 lbs per ASTM D6241.
- E. Apparent Opening size (AOS) to be equal to the U.S. Standard Sieve No. 100 (0.15 mm) per ASTM D4751.
- F. Flow Rate of 75 gal/min/sf per ASTM D4355.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, tanks, utilities, sidewalks, pavements, fencing, landscaping, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 - 1. If necessary, remove and restore or replace curbing, driveway aprons, and fencing after performing backfilling work.
 - 2. Replace existing facilities damaged by construction with new material fully equal to existing without additional compensation.
- B. Prior to and During Earthwork Operations:

1. Protect and maintain erosion and sedimentation controls; coordinate with Section 312500 "Erosion and Sedimentation Controls."
2. Provide, monitor, and maintain excavation support.
 - a. Use excavation support system for excavations within the zone of influence for existing structures or utilities.
 - b. Do not permit excavations below base level of adjacent foundations or retaining walls, unless excavation design and bracing includes an analysis of structure's stability supported by the foundation. When necessary due to project conditions, incorporate required bracing and foundation underpinning.
3. Provide, monitor, and maintain dewatering and drainage systems.

C. Test Pits:

1. Perform exploratory excavation work, test pits, for purpose of verifying the location of underground utilities and structures and to check for unknown utilities and structures, prior to commencing excavation work.
2. Backfill and compact test pits as soon as desired information has been obtained. Stabilize backfilled surfaces in accordance with approved erosion and sedimentation control plans.

D. Clearing and Stripping. Initially clear and strip ground surfaces beneath planned structures and in areas requiring excavation or filling of organic material and debris. Do not use those materials as On-Site Fill Material; remove from the site and properly disposed or reused as topsoil in landscape areas.

E. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

F. Saw cut existing pavement with a saw, wheel, or pneumatic chisel along straight lines before excavating.

3.2 DEWATERING AND DRAINAGE

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff and groundwater seepage away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

C. Prior to excavation, verify groundwater will be at required level indicated on approved dewatering and drainage submittal.

D. Accomplish dewatering by methods that preserve undisturbed state of subgrade soils. Dewater in a manner to prevent boiling, detrimental under-seepage, or disturbance at excavation base.

3.3 SUPPORT OF EXCAVATION

- A. Provide excavation support as required.
- B. Install excavation support in accordance with reviewed Shop Drawings prior to beginning excavation work. Maintain excavation supports that are required to remain in place, if applicable, as indicated on Drawings or as required by approved Shop Drawings.
- C. Owner or The Engineer may direct that certain excavation supports remain in place or be cut off at any specific elevation. Supports directed by Owner or The Engineer to be left in place and not so designated on Contract Documents will be paid for according to Contract provisions for changes in the Work.
- D. The right of Owner or The Engineer to direct that certain excavation supports remain in place shall not be construed as creating any obligation on Owner or The Engineer to give such direction, nor shall failure to give such direction relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient excavation supports to prevent any movement of the ground or damage to adjacent structures.
- E. Construct temporary excavation slopes in accordance with the requirements of OSHA excavation safety standards and approved Shop Drawings.
- F. Where allowed, carefully remove excavation supports in a manner without endangering the Work or other adjacent structures, utilities, or property. Immediately fill voids left or caused by withdrawal of supports with sand and compact.

3.4 EXCAVATION

- A. Include material of every description and of whatever substance encountered as an unclassified excavation.
- B. General: Excavate on-site soils using standard earthmoving equipment. Excavation in dense soil or rock may require special equipment. Do not plough, scrape, or dig earth with machinery so near to finished subgrade to result in excavation of or disturbance of below grade material.
- C. Make excavations to grades indicated on Drawings and in widths sufficient for laying of pipe, construction of the structure, installing bracing, excavation supports, dewatering and drainage facilities, and working clearances.
- D. Perform excavation in-the-dry and accomplished by methods which preserve the natural undisturbed condition of subgrade soils.
- E. Moisture Sensitive Soils: Use a smooth-edge bucket to excavate last one foot of depth when excavation is to end in such soils.
- F. If excavation bottom is removed below the limits shown on Drawings, specified, or directed by The Engineer, refill with structural fill or screened gravel satisfactory to The Engineer without additional compensation.

- G. When excavation has reached prescribed depths, notify The Engineer who will observe the conditions. If materials and conditions are not satisfactory, The Engineer will issue instructions for corrective procedures. The Engineer will be the sole judge as to whether the work has been accomplished satisfactorily.
- H. Subgrade soils that have become soft, loose, quick, or otherwise unsatisfactory due to inadequate excavation, dewatering, or other construction methods in the opinion of The Engineer, shall be removed and replaced with structural fill or screened gravel as acceptable to The Engineer at Contractor's expense.
- I. Exposed subgrades in large open areas, for foundations shall be proof rolled with at least four overlapping coverages of a vibratory drum roller with a minimum static drum weight of 10 ton. Conduct proof-rolling in presence of The Engineer. The Engineer will waive this requirement, if in its opinion the subgrade will be rendered unsuitable by such proof-rolling.
 - 1. Confined Areas: Proof-roll with hand operated vibratory equipment that is approved by The Engineer.
- J. Perform overexcavation at The Engineer's request to remove unsuitable soil, objectionable material, or other materials as determined by The Engineer and to such depth and width as directed. Replace with suitable material as directed by The Engineer.
 - 1. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- K. Perform excavation for pipelines beneath structures and excavation for footings with excavating equipment operating from the subgrade for the structure, while in-the-dry and in a manner preserving the undisturbed state of subgrade soils.
- L. When excavations have reached the required subgrade, including any allowances for working mats or base materials and prior to their placement, notify soils testing laboratory to verify suitability of existing subgrade soils for anticipated foundation and structural loadings.
 - 1. If existing subgrade soils are determined to be unsuitable, follow direction provided by The Engineer regarding removal and replacement with suitable materials.
 - 2. Notify Engineer if the revised work scope would modify Contractor's cost and thereby entitle a change to the Contract Sum. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- M. Replace overexcavation beyond the limits and depths required by Contract Documents using structural fill or screened gravel satisfactory to The Engineer without additional compensation.
- N. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - 3. Cut and protect roots according to requirements in Section 015000 "Temporary Facilities and Controls."

3.5 SUBGRADE PREPARATION

- A. Notify Engineer when excavations have reached required subgrade.
- B. Maintain excavated subgrade in-the-dry condition.
- C. Prior to fill placement, remove objectionable material which includes, but not be limited to, pavement, topsoil, organic matter, contaminated soil, construction debris, perishable materials, snow, ice, frozen earth, and rocks or lumps of cemented soils over 6 inches in maximum dimension.
- D. For subgrades consisting of granular soils, proof roll the final subgrade using at least four coverages of a vibrator plate compactor.
- E. Where existing subgrade contains a significant amount of clay or cohesive soils, over-excavate sufficiently below the bottom of structure for placement of a lean concrete working mat. Remove loose or soft material from the subgrade immediately prior to placing lean concrete working mat.
- F. Remove and replace soft subgrades or unusable material with structural fill, screened gravel or other material satisfactory to the Engineer.
- G. During wet or freezing weather, or in areas where exposed subgrade consists of moisture-sensitive soils, take measures to protect foundation excavations once they have been approved by The Engineer. Protective measures include, but are not limited to, placing insulation blankets, placing a layer of sacrificial fill, pea gravel, crushed rock, or lean concrete on the exposed subgrade, or covering the exposed subgrade with a plastic tent.
 - 1. If additional overexcavation is required due to the subgrade not being protected against wet or freezing weather, perform additional work without additional compensation.
- H. Notify Engineer to observe conditions following subgrade preparation and prior to fill placement. If existing subgrade soils are determined to be unsuitable, follow direction provided by The Engineer regarding removal and replacement with suitable materials.
 - 1. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

3.6 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. Protect from precipitation.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 GEOTEXTILE FILTER FABRIC

- A. Geotextile filter fabric shall be placed where shown on the Drawings and/or specified.

- B. The filter fabric shall be unrolled and placed onto the prepared subgrade or trench bottom as shown on the Drawings.
- C. Filter fabric shall be unrolled and placed on the prepared subgrade beneath structures requiring the use of filter fabric. Fabric shall extend 6-in beyond the structure and manhole foundations.
- D. Where more than one section of fabric is required, the fabric shall be overlapped no less than 12-in to assure the continuity of the filter.
- E. The subgrade shall be inspected and acceptable to the Engineer prior to the installation of the filter fabric. The subgrade shall be maintained in a smooth, uniform, and compacted condition during the installation of the filter fabric. No mechanical equipment shall be driven directly on top of the filter fabric unless permitted by the Engineer. The fabric shall be stored in such a way that it is protected from prolonged exposure to ultraviolet radiation.
- F. If the fabric is damaged during installation, it shall be immediately repaired. All backfill shall be removed from the affected area. A patch of fabric large enough to cover the damage plus an 18-in overlap shall be placed on top of the damaged section and fastened as recommended by geotextile manufacturer.

3.8 FILL PLACEMENT AND COMPACTION PROCEDURES

- A. Fill and Backfill: Place materials in lifts to suit specified compaction requirements to required lines and grades, making allowances for settlement and placement of cover materials, such as topsoil or sod. Correct soft spots or uncompacted areas.
- B. Do not place or compact fill and backfill when materials are too wet to properly compact.
 - 1. In-place Soil Moisture Content: Maximum of three percentage points above optimum moisture content of soil, as determined by laboratory test of moisture-density relation appropriate to specified level of compaction.
- C. Structural Fill and Embankment Fill: Construct to required lines and grades, making allowances for settlement and placement of cover materials, such as topsoil and sod. Correct soft spots or uncompacted areas.
- D. Fill material shall be free of snow, ice, frost, and frozen earth. Do not place fill materials on frozen surfaces or surfaces covered by snow, ice, or frost.
- E. If subgrade slopes more than 10 percent, step subgrade to produce a stable, horizontal surface for placement of fill materials. Scarify existing subgrade slope to a depth of at least 6 inches.
- F. Compact filled slopes by slope rolling and trimming or overfill and trim back to plan grade to expose a firm, smooth surface free of loose material.
- G. Do not allow fill lifts to contain stones with a dimension larger than 2/3 the specified loose measure lift thickness.
- H. Perform compaction in open areas using compaction equipment by any of the following methods:

1. Fully loaded ten-wheel trucks or front-end loaders.
 2. Tractor dozers weighing minimum of 30,000 pounds.
 3. Heavy vibratory rollers.
- I. Confined Compaction: Perform compaction in confined areas, including areas within a 45-degree angle extending upward and outward from the base of a wall, and in areas where the use of large equipment is impractical, using hand-operated vibratory equipment or mechanical tampers.
1. Do not exceed lift thickness of 6 inches, measured before compaction, when using hand operated equipment.
- J. Moisture condition on-site fill material prior to placement, unless Contractor demonstrates to The Engineer in-place moisture conditioning methods can achieve the required moisture content.
- K. Conduct compaction of each specified lift of fill materials by a minimum of four complete coverages with acceptable compaction equipment to a specified density as a percentage of maximum dry density as determined by ASTM D1557, unless otherwise specified.
- L. Use structural fill required beneath foundations or slabs on grade, except sidewalks. Place and compact structural fill in even lifts having a maximum thickness of 8 inches, measured before compaction.
- M. Use select fill and backfill material placed within 10 feet of all structures. Uniformly place and compact select fill around the structure in even lifts having a maximum thickness of 8 inches, measured before compaction.
- N. Use common fill in areas beyond those designated for structural fill or select fill, unless shown or otherwise specified. Place in even lifts having a maximum thickness of 12 inches, measured before compaction.
- O. Place impervious fill in controlled, even lifts having a maximum thickness (measured before compaction) of 6 inches.
1. Permeability: Compact to attain a reading of less than 1×10^{-7} cm/sec.
 2. Moisture Content: Compact to optimum moisture content of minus 2 percent to plus 3 percent.

3.9 COMPACTION REQUIREMENTS

- A. Perform in-place testing of compacted fill lifts to measure in-place density and water content according to ASTM D6938 and ASTM D1557.
- B. Beneath Foundations and Slabs-on-Grade, except sidewalks: Compact top 12 inches of existing subgrade and each layer of fill, if applicable to:
1. Maximum Dry Density: Minimum of 95 percent for ASTM D1557.
 2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

- C. Area Around Structures: Within 10 feet compact each fill or backfill layer to:
 - 1. Maximum Dry Density: Minimum of 92 percent for ASTM D1557.
 - 2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.
- D. Embankments, Lawn, or Unimproved Areas: Does not include embankments under roadways and earth dam structures. Compact each fill or backfill layer to:
 - 1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557.
 - 2. Moisture Content: At or near its optimum moisture content of minus 1 percent to plus 4 percent.
- E. Sidewalks: Compact each fill layer to:
 - 1. Maximum Dry Density: Minimum of 92 percent for ASTM D1557.
 - 2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.
- F. Roads, Paved Areas, and Roadway Embankments: Compact each layer of fill or backfill to:
 - 1. Maximum Dry Density: Minimum of 95 percent for ASTM D1557.
 - 2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

3.10 DISPOSAL OF UNSUITABLE, WASTE, AND SURPLUS EXCAVATED MATERIALS

- A. Unsuitable soil, objectionable material, waste, and surplus excavated material shall be removed and disposed of off-site. Materials may be temporarily stockpiled in an area within the limits of construction that does not disrupt construction activities, create any nuisances or safety hazards, or otherwise restricts access to work site.
- B. Topsoil or loam excavated under this Section may be salvaged for use as specified under Section 329200 "Turf and Grasses," as approved by The Engineer.

3.11 GRADING

- A. Perform grading to lines and grades shown on Drawings. Remove objectionable materials encountered within the limits indicated and disposed of off-site. Completely and continuously drained and dewatered subgrades throughout the grading process. Install temporary drains and drainage ditches to intercept or divert surface water that may affect the execution or condition of grading work.
- B. If it is not possible at the time of grading to place material in its proper section of the Work, stockpile it in approved areas for later use. No additional compensation will be made for stockpiling or double handling of excavated materials.
- C. In cut areas, remove loose or protruding rocks in slopes to line or finished grade of the slope. Uniformly dress, cut, and fill slopes to slope cross-section and alignment shown on Drawings, unless otherwise directed by The Engineer.

3.12 FIELD QUALITY CONTROL

- A. Test and observe materials as described in this Article. Cooperate by allowing free access to work for selection of test materials and observations.
- B. General Testing Requirements:
 - 1. At Structures: Prior to placement of bedding material, concrete work mats, structural fill or structural concrete, coordinate with approved Soils Testing Laboratory to verify suitability of existing subgrade soil.
 - 2. Backfill and Fill: Prior to and during the placement of backfill and fill coordinate with approved Soils Testing Laboratory to perform in-place soil density tests to verify that backfill and fill material has been placed and compacted in accordance with specified compaction requirements.
 - a. Provide minimum 48 hours' notice prior to placement of backfill and fill.
 - 3. Subgrade: Do not cover with fill without observation, testing, and approval by approved Soils Testing Laboratory.
 - a. Earthwork activities performed without properly scheduled inspection are subject to removal and replacement or additional testing as directed by The Engineer without additional compensation.
- C. Test materials by a certified independent laboratory, engaged by Contractor and acceptable to The Engineer, demonstrating conformance with project requirements. Deliver test reports and material certifications to The Engineer before using any material in the work.
- D. If field test results are not in conformance with project requirements, costs involved in correcting deficiencies in compacted materials to satisfaction of The Engineer without additional compensation.
- E. Earthwork activities performed without properly scheduled inspection are subject to removal and replacement or additional testing as directed by The Engineer without additional compensation.
- F. Testing methods shall comply with latest ASTM or equivalent AASHTO Standards applicable during bidding.
- G. During placement of bedding, backfill, and fill, perform in-place soil density testing to confirm that fill material has been compacted in accordance with project requirements. The Engineer may designate areas to be tested. Notify Engineer at least 72 hours in advance of scheduled compaction testing. In place soil density tests on backfill and fill material shall be as required by authorities having jurisdiction, project geotechnical report, add additional references as appropriate, but in no instance, shall less than those listed:
 - 1. Structures and Embankments: At least one density and moisture content test for each 2,500 square feet of surface area for each lift of fill at embankment, structure, and manhole locations.

2. Trench Excavations: At least one nuclear density and one moisture content test at a maximum of 50 feet intervals for each lift of fill placed or as directed by The Engineer.
 3. The Engineer may designate supplemental areas to be tested at additional compensation.
- H. Materials which have been previously tested may be subjected to further testing from time to time and may be rejected, if it is determined that results do not conform to project requirements. Immediately remove rejected materials when directed by The Engineer, notwithstanding results of previous testing.
- I. The Engineer or Owner may conduct additional soil testing. Cooperate fully in allowing additional test to be made, including free access to the work.
- J. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

3.13 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 The Engineer; 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.

END OF SECTION 312000

SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

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. Construction Entrances.
 - 2. Erosion Control Blanket.
 - 3. Straw Wattle.
 - 4. Siltation Control Device for Catch Basins and Inlets

- B. Related Sections:

- 1. Section 033000 "Cast-In-Place Concrete."
 - 2. Section 310515 "Soils and Aggregates for Earthwork."
 - 3. Section 311000 "Site Clearing."
 - 4. Section 329200 "Turf and Grasses"

- C. ACTION SUBMITTALS Requirements for submittals: Submit, within 10 days after award of Contract, technical product literature for all commercial products.

- D. Submit proposed mix design of each class of concrete for review prior to commencement of Work.

- E. Samples:

- 1. Submit two samples of rock, minimum 5 tons each or one half total project quantity, whichever is smaller. Provide one sample in place at construction site and provide other sample at quarry. Construction site sample may be incorporated into the Work. Samples will be used as reference for judging size, and gradation of rock supplied and placed.

- F. Test Reports: Indicate certified test results for precast concrete at manufacturing facility, cast-in-place concrete in field, and granular backfill.

- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

- H. Certificate: Certified statement as specified in "Erosion Control Blanket" Article.

1.3 INFORMATIONAL SUBMITTALS

- A. Stormwater Pollution Prevention Plan (SWPPP) as specified in “Quality Assurance” article.
- B. Copy of EPA NPDES Notice of Intent to Discharge submitted to the EPA as specified in “Quality Assurance” article.

1.4 QUALITY ASSURANCE

- A. Adhere to EPA document “Stormwater Management for Construction Activities – Developing Pollution Prevention Plans and Best Management Practices” document number EPA 832-R-92-005, dated 1992, or most recent edition. State or appropriate Conservation Commission standards can be substituted for the EPA standard if the State or Conservation Commission standard is equal to, or more detailed than, the EPA standard.
- B. Prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the U.S. Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES) General Permit applicable to this work) document number EPA 832-R-92-005, dated 1992, or most recent edition.
- C. Prepare and submit the EPA NPDES Notice of Intent to Discharge to the applicable EPA office in accordance with EPA regulations.

1.5 PRE-INSTALLATION MEETINGS

- A. Section 013100 “Project Management and Coordination”: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not place grout when air temperature is below freezing.
- B. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 2.1

2.1 EROSION CONTROL BLANKET

- A. Erosion control blankets: 100 percent agricultural straw fiber matrix, 0.5 lbs / sq. yd., stitch bonded with degradable thread between two photodegradable polypropylene nettings.
 - 1. Product: Provide Model S150 Double Net Short-Term Blanket (12 months) by North American Green, Evansville, IN), or equal.

- B. Prior to start of work, provide a certified statement as to the number of pounds of materials to be used per 100 gallons of water. Specify the number of square feet of seeding that can be covered with the quantity of solution in the Contractor's hydroseeder.

2.2 STRAW WATTLE

- A. Straw Wattle: Prefabricated commercial product with outside casing made up of organic hessian.
 - 1. Effective Height: 12 inches plus or minus 1 inch.
 - 2. Effective Circumference: 38 inches.
- B. Product: Provide products by Phase II Stormwater Products, Wrentham, MA or equal.

2.3 SILTATION CONTROL DEVICE FOR CATCH BASINS AND INLETS

- A. Where catch basins and surface drainage inlet structure existing on site, a siltation control device shall be used to trap sediment and prevent the drainage system from clogging. Siltation control device(s) shall be installed between the frame and grate. Clean and maintain the siltation control device(s) on a regular basis and as directed by the Owner or Engineer.
- B. The siltation control device will be a woven sack that is sewn with a double needle machine using high strength thread.
- C. Siltation control device shall be SILTSACK as manufactured by ACF Environmental, Inc. or approved equal.
- D. The siltation control device will be manufactured to fit the opening of the catch basin or surface drainage inlet structure. The siltation control device will have the following features; two dump straps attached to the bottom of the sack to facilitate the dumping of the trapped sediment. The top of the siltation control device shall have lifting loops as an integral part of the sack to be used to lift the partially filled sack out to empty. The siltation control device shall have a restraining strap approximately halfway up the sack to keep the sides away from the catch basin or surface drainage inlet structure walls. This yellow strap is a visual means of determining when the sack needs to be emptied. Once the strap is covered with sediment, the siltation control device should be emptied, cleaned and placed back in the catch basin or surface drainage inlet structure.
- E. The geotextile fabric shall be woven fabric with the following properties:

HI FLOW

Property	Test Method	Test Result
Grab Tensile	ASTM D4632	265 lbs.
Grab Elongation	ASTM D4532	20 percent
Puncture	ASTM D4833	135 lbs.
Mullen Burst	ASTM DI-3786	420 P.S.I.
Trapezoid Tear	ASTM D4533	45 lbs.
UV Resistance	ASTM D4355	90 percent

Apparent Opening Size	ASTM D4751	20 US Sieve
Flow Rate	ASTM D4491	200 gal/min/sf
Permittivity	ASTM D4491	1.5 sec ⁻¹
Average Strength	ASTM D4884	100 lb/in

2.4 PLANTING MATERIALS

- A. Sod and Soil Supplements: as specified in Section 329200 “Turf and Grasses.”

2.5 SOURCE QUALITY CONTROL (AND TESTS)

- A. Perform tests on cement, aggregates, and mixes to ensure conformance with specified requirements.
- B. Test samples in accordance with ACI 301.
- C. Make aggregate available for inspection at producer's quarry prior to shipment. Notify Engineer at least seven days before inspection is allowed.
- D. Allow witnessing of inspections and test at manufacturer's test facility. Notify Engineer at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 013100 “Project Management and Coordination” for verification of existing conditions before starting work.
- B. Verify compacted subgrade, granular base, stabilized soil is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations of base or foundation for other work are correct.

3.2 CONSTRUCTION ENTRANCE

- A. Construct entrance with minimum of 6 inch of course aggregate at all points of ingress/egress.
- B. Width: Minimum 20 feet, increased as needed for typical construction vehicles.
- C. Minimum Length: 50 feet
- D. Install filter fabric below aggregate.
- E. Maintain entrance throughout construction, adding more aggregate or increasing length as needed.

3.3 EROSION CONTROL BLANKETS

- A. Install erosion control blankets onto all exposed slopes to be loamed and seeded that are steeper than 4(Horizontal) to 1(Vertical) as shown on the Drawings. Erosion control blankets shall also be installed in all seeded drainage swales and ditches, and as directed by the Engineer in accordance with manufacturer's instructions.
- B. The area to be covered shall be properly prepared, fertilized and seeded with permanent vegetation before the blanket is applied. When the blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. The blankets shall be applied in the direction of water flow and stapled.
- C. Place blankets and stapled together in accordance with manufacturer's instructions. Side overlaps shall be 4 inch minimum. The staples shall be made of wire, 0.091 inch in diameter or greater, "U" shaped with legs 10-inch in length and a 1-1/2-inch crown. Commercial biodegradable stakes may also be used with prior approval by the Engineer. The staples shall be driven vertically into the ground, spaced approximately two linear feet apart, on each side, and one row in the center alternately spaced between each side. Upper and lower ends of the matting shall be buried to a depth of 4-inch in a trench. In swales and ditches, erosion stops shall be created every 25-feet by making a fold in the fabric and carrying the fold into a silt trench across the full width of the blanket. The bottom of the fold shall be 4-inch below the ground surface. Staple on both sides of fold. Where the matting must be cut or more than one roll length is required in the swale, turn down upper end of downstream roll into a slit trench to a depth of 4-inch. Overlap lower end of upstream roll 4-inch past edge of downstream roll and staple.
- D. To ensure full contact with soil surface, roll matting with a roller weighing 100 lbs/ft of width perpendicular to flow direction after seeding, placing matting and stapling. Thoroughly inspect channel after completion. Correct any areas where matting does not present a smooth surface in full contact with the soil below. EC blankets for bottom of swales and along edge of pathways.

3.4 STRAW WATTLE

- A. Position straw waddles as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
- B. Drive wooden stakes, 5 feet on center (maximum) at back edge of waddle. Drive stakes 2 feet (minimum) into ground.
- C. Install pre-fabricated straw waddle according to manufacturer's instructions.

3.5 SILTATION CONTROL DEVICE FOR CATCH BASINS

- A. Install Siltation control device at Catch Basins shown on the Drawings in accordance with manufacturer's instructions.

3.6 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Stockpile and waste pile heights shall not exceed 10 feet. Slope stockpile sides at 2: 1 or flatter.
- D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
 - 1. During non-germinating periods, apply mulch at recommended rates.
- E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.7 FIELD QUALITY CONTROL

- A. Section 017300 “Execution” for field inspecting, testing, adjusting, and balancing.
- B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.
- C. Field test concrete in accordance with Section 033000 “Cast-in-Place Concrete.”
- D. Compaction Testing: In accordance with ASTM D1557.
- E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- F. Frequency of Compaction Testing: One for each lift.

3.8 CLEANING

- A. Section 017300 “Execution” and Section 017700 “Closeout Procedures” for requirements for cleaning.
- B. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
- C. Do not damage structure or device during cleaning operations.
- D. Do not permit sediment to erode into construction or site areas or natural waterways.
- E. Clean channels when depth of sediment reaches approximately one-half channel depth.

3.9 PROTECTION

- A. Section 017300 “Execution” for requirements for protecting finished Work.
- B. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- C. Do not permit construction traffic over paving for 7 days minimum after finishing.
- D. Protect paving from elements, flowing water, or other disturbance until curing is completed.

END OF SECTION 312500

SECTION 312500 - ASPHALT PAVING

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. Asphalt materials.
 - 2. Aggregate subbase.
 - 3. Asphalt paving binder course and surface course.

1.3 DEFINITIONS

- A. MSSHB

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit product information for asphalt and aggregate materials.
 - 2. Submit mix design with laboratory test results supporting design.

1.5 QUALITY ASSURANCE

- A. Conform to City of Watertown Department of Public Works Design and Construction Guidelines, relevant provisions of Mass DOT Standard Specifications for Highways and Bridges (MSSHB) Include the following paragraph only when cost of acquiring specified standards is justified.
- B. Do not place asphalt mixture between November 15 and April 1.
- C. Asphalt mixture shall only be placed on dry, unfrozen surfaces and only when the temperature requirements contained in MSSHB Table 460.42-1 are satisfied.
- D. Proceed with pavement marking only on clean, dry surfaces and a minimum ambient or surface temperature of 45 degrees F and rising, and not exceeding 95 degrees F.
- E. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.1 ASPHALT PAVING

A. Performance / Design Criteria:

1. Paving: Design for pathways as shown on the drawings and where pavement is disturbed by contractors activities.

B. Asphalt Materials:

1. Asphalt: In accordance with of MSSHB Section 460, and in accordance with M3.07 for driveways, sidewalks, berm and curb.
2. Tack Coat; diluted emulsified asphalt, grade RS-1 conforming to Section M3.03.0 or cutback asphalt grade RC-70 or RC-250 conforming to Section M3.02.0 of MSSHB setting type and be applied to all layers of Pavement Materials (including asphalt pathway). Paint on all contact surfaces of castings and other structures.

C. Aggregate Subbase: In accordance with MSSHB Subsection 402: Dense Graded Crushed Stone for Sub-Base and M2.01.7.

2.2 ASPHALT MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Asphalt Paving Mixtures: Designed in accordance with MSSHB.

1. Subbase: Dense graded crushed stone as required to meet finished grade.
2. Binder Course: Superpave Intermediate Course -12.5.
3. Surface Course: Superpave Surface Course - 4.75 or 9.5 (Pathways).

C. Asphalt Pathway: Conform to MSSHB Sections 702 and M3.07.0.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.

B. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.

1. Proof roll subbase with minimum two perpendicular passes to identify soft spots.
2. Remove soft subbase and replace with compacted fill as specified.

C. Verify gradients and elevations of base are correct.

D. Verify manhole frames and all other structures are installed in correct position and elevation.

3.2 PREPARATION

- A. Prepare subbase in accordance with MSSHB.
- B. Clean and sweep the underlying surface to remove foreign material, excess joint sealant and crack filler from paving surface prior to tack coat and paving.
- C. Review methods and procedures related to marking asphalt paving including, but not limited to, aging period before application and protection during installation.

3.3 DEMOLITION

- A. Saw cut and notch existing paving.
- B. Repair surface defects in existing paving to provide uniform surface to receive new paving. Any structural distresses such as alligator cracking or potholes shall be cut out and patched prior to overlay.

3.4 INSTALLATION

- A. Subbase:
 - 1. Prepare subbase in accordance with MSSHB.
 - 2. Subbase compacted in maximum 6-in lifts.
- B. Compaction
 - 1. The dense-graded crushed stone shall be spread and compacted in layers not exceeding six inches in depth. All layers shall be compacted to not less than 95% of the maximum dry density of the material as determined by AASHTO T99 Method C at optimum moisture content.
 - 2. Conduct compaction test a minimum of 1 test centered in the pavement repair area.
 - 3. Payment for testing will be made by the Contractor. If test results are unsatisfactory, all costs involved in correcting deficiencies in compacted materials to the satisfaction of the Landscape Architect/Engineer will be borne by the Contractor.
- C. Primer:
 - 1. Apply primer in accordance with MSSHB.
 - 2. Use clean sand to blot excess primer.
- D. Tack Coat:
 - 1. Apply tack coat in accordance with MSSHB.
 - 2. Applied Tack coat over existing pavement after sweeping at a minimum rate of .07 - .09 Gallons/square yard.

E. Asphalt Paving:

1. Install work in accordance with the MSSHB.
2. Place binder course to thickness indicated on Drawings.
3. Place surface course within 24 hours of placing and compacting binder course.
4. When binder course is placed more than 24 hours before placing surface course, clean and sweep surface and apply tack coat before placing surface course.
5. Place surface course to thickness indicated on Drawings.
6. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
7. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.5 TOLERANCES

- A. Cross slope for pathways shall be less than 2%. Longitudinal slope for pathways shall be less than 5%.
- B. Flatness: Maximum variation of 1/8 inch measured with 10 foot straight edge.

3.6 FIELD QUALITY CONTROL

- A. In accordance with the MSSHB Section 400, 500, 700 and 800.

3.7 PROTECTION

- A. Immediately after placement, protect paving from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

END OF SECTION 321216

SECTION 321816.13 – NON-POROUS SURFACING SYSTEM FOR SPRAY DECK

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. Non-porous surfacing system for spray deck, designed to be applied over a concrete base consisting of a non-porous thermoplastic aliphatic rubber intended for use in wet environments and designed to hold up to weather and chlorine.

1.3 ACTION SUBMITTALS

- A. Product Data: For non-porous surfacing system.
- B. Samples for Verification: For protective surfacing and exposed finish:
 - 1. Include samples to verify color and finish selection.
 - 2. Provide a minimum 6 by 6 inches sample.
 - 3. Provide available color selection samples.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Utilize installer approved and trained by the manufacturer of the playground surfacing system having demonstrated a minimum of 5 years' experience and provided successful completion of a minimum of ten like surfaces installed for municipalities during the past five years. Provide reference project list including Owner's contact information.
- B. Product Certificates: Non-porous surfacing system.
- C. Field quality-control reports, if applicable.
- D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For non-porous surfacing system.

1.6 QUALITY ASSURANCE

- A. Certifications: Certification by manufacturer that installer is an approved applicator of the non-porous surfacing system.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution:
 - 1. Build mockups for protective surfacing including accessories.
 - a. Size: 48 inches by 48 inches.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period:
 - 1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation as measured by reduction of critical fall height.
 - b. Deterioration of protective surfacing and other materials beyond normal weathering.
 - 2. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain protective surfacing materials from single source from single manufacturer.:

2.2 NON-POROUS SURFACING SYSTEM

- A. Non-porous surfacing system shall be one of the following:
 - 1. AquaFlex (Non-Porous) Surfacing System as supplied by Surface America, Inc., Williamsville, NY 14231, www.surfaceamerica.com.
 - 2. DuraSplash Water-Play Surface as supplied by DuraPlay, Inc. Driftwood, TX 78619, <https://duraplay.com/services/durasplash-water-play-surface/>.

3. Water Flecks System as manufactured by AquaSeal Safety Surfacing, 7681 Tim Ave NW, North Canton, Ohio 44720, <https://aquasealllc.com/water-park-safety-surfacing/water-flecks/>.
 4. Or approved equal.
- B. Basis of Design: Product specifications below are based upon AquaFlex Non-Porous Surfacing System.
- C. Materials:
1. Aquaflex HC, 100% solids, two-component aliphatic polyurethane binder/ primer; a combination of 50% AquaFlex aliphatic thermoplastic large pebbles and 50% small pebbles.
 2. The AquaFlex pebbles are thermoplastic aliphatic polyurethane. The system is 100% color.
 3. The AquaFlex HC Binder/Primer is a two-part aliphatic, chlorine-resistant polyurethane.
 4. Any equal product granule or pebble must be aliphatic polyurethane based; not rubber based such as EPDM, TPV, polyolefin-based TPE;
 5. Product must include a two-part aliphatic polyurethane binder proven to be chlorine resistant and must be 100% color.
 6. Recycled black material is not acceptable.
 7. Provide finish that is rough grain and non-skid.
- D. Color
1. Provide manufacturers color chart for selection by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary, protective surfacing installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to protective surfacing manufacturer's written requirements for cross-section profile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Temperature must remain above 50-degrees Fahrenheit throughout the installation and curing process. Weather and surface must be dry, and there should be no rain in the immediate forecast.
- D. Secure site during curing period.

3.2 PREPARATION

- A. Concrete Pad:
 1. New concrete must be at least 28 days old.

2. All concrete must be acid etched. Add acid slowly to water in clean polyethylene buckets at a ratio of eight parts water to one part acid. Care should be taken to prevent splashing on workers. Protective clothes such as safety glasses, rubber gloves and boots should be used.
3. The acid solution should be applied on the surface at a rate of 100 square feet per 5 gallons of acid solution. Using a stiff broom, scrub acid solution onto the surface where the solution was poured and continue the process to other areas. Never let the surface dry with acid on it.
4. After 5 minutes, rinse the surface with large amounts of clean water to remove all the acid solution, and then allow the surface to dry.

3.3 INSTALLATION OF NON-POROUS SURFACING

A. Sealing:

1. Premix AquaFlex HC aliphatic two-component Binder/Primer in a plastic pail with a paddle mixer and add 2 times the volume of primer of calcium carbonate to thicken the liquid to a paste consistency.
2. Pour the entire mixture onto surface in a tight line.
3. Using a hand float rubber squeegee pull the material over the surface making sure to cover the entire surface filling all voids, or use rubber hand squeegee to cover the surface filling all voids.
4. Let cure until tack free.

B. AquaFlex Mixing and Finishing Dry:

1. Mix a ratio of 50 pounds large pebbles to 50 pounds of small pebbles creating 100 pounds of AquaFlex pebbles in a mortar mixer.
2. Pre-mix 2.14 gallons of AquaFlex HC aliphatic two-component binder in an appropriate plastic container with a paddle mixer.
3. Add the premixed 2.14 gallons of binder to the pebbles in the mortar mixer.
4. Mix thoroughly so that all pebbles are covered evenly.
5. Dump the mix onto the area and spread it with a cam rake or screed box at a thickness of 7/16".
6. Fresno the area keeping the surface as level as possible. Hand or power-trowel the surface using a solution of AquaFlex Trowel Slick to lubricate the surface of the trowel. This will allow easier manipulation of the trowel. Do not use water on the surface as a troweling aid.
7. The compounded mixture will compress to approximately 3/8".
8. Let the surface set for 72 hours.

3.4 FIELD QUALITY CONTROL

- A. If the surfacing does not meet accessibility standards, the Contractor will be required to bring the surfacing up to compliance within 30 days or less. The extent of failure and determination of replacement will be at the discretion of the Owner. Should they be found during or after installation, any violations of the C.P.S.C. guidelines, ASTM, ADA or impact attenuation performance requirements shall be corrected to the satisfaction of the Owner. Any proposed

corrective work shall be reviewed and approved by the Designer before corrective action work begins.

3.5 PROTECTION

- A. Prevent traffic over surfacing for not less than 48 hours after installation.

END OF SECTION 321816.13

SECTION 329113 - SOIL PREPARATION

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 planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 310515 "Soils and Aggregates for Earthwork" for material below planting soil.
 - 2. Section 311000 "Site Clearing" for topsoil stripping.
 - 3. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. AOAC: Association of Official Analytical Chemists.
- C. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- D. CEC: Cation exchange capacity. The measure of a soil's ability to retain and supply nutrients.
- E. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- F. CPSS: Certified Professional Soil Scientist
- G. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- H. Imported Soil: Soil that is transported to Project site for use.
- I. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- J. Methods of Soil Analysis: Standards of soil testing by the AOAC.

- K. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- L. NRCS: Natural Resources Conservation Service
- M. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- N. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- O. SSSA: Soil Science Society of America.
- P. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- Q. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- R. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- S. USCC: U.S. Composting Council.
- T. USDA: U.S. Department of Agriculture
- U. USDA Textural Classification System: The USDA system of classifying soils by their proportions of sand, silt and clay within the USDA soil triangle.

1.4 0ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

- B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing by the following :
 - a. A&L Eastern Laboratories, Inc. 7621 Whitepine Road, Richmond VA 23237, www.environmental-expert.com/companies/a-l-eastern-laboratories-inc-23387 Tel No. (804) 743-9401 or equal.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on imported soil.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.8 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of one representative soil samples from source location for each soil to be used or amended for lawn establishment or landscaping purposes.

2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."

1.9 TESTING REQUIREMENTS (Imported soils)

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).
 5. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- C. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
 1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).
 4. Nitrogen ppm.
 5. Phosphorous ppm.
 6. Potassium ppm.
 7. Manganese ppm.
 8. Manganese-availability ppm.
 9. Soluble-salts ppm.
 10. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 11. Other deleterious materials, including their characteristics and content of each.
- D. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

- E. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
 - 1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
 - 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Do not move or handle materials when they are wet or frozen.
 - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type Loam: Imported, naturally formed soil from off-site sources and consisting of sandy loam soil according to USDA textures; and modified to produce viable planting soil.
 - 1. Loam Composition:
 - a. Sand: 75 percent by weight (particles less than 2.0 mm and greater than or equal to 0.05mm in diameter)
 - 1) At least 90% of sand fraction - fine to medium (0.5mm and greater than or equal to 0.1mm in diameter)
 - b. Gravel: 3 percent maximum (particles less than 25.4 mm and greater than or equal to 2.0 mm in diameter)

- c. All material: 100 percent finer than 25.4mm diameter
 - 2. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass.
 - 3. Additional Properties of Imported Soil before Amending: Soil reaction of pH 5.5 to 6.5 and of 5.0 to 8.0 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 - 4. Unacceptable Properties: Clean soil of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1 inch in any dimension.
 - 5. Amended Soil Composition: Blend imported, unamended soil with soil amendments and fertilizers in the following quantities to produce planting soil meeting pH, organic matter and nutrient requirements
- C. Planting-Soil Type for shrub bed along Westminster Ave.: CU Structural Soil supplied by Read Custom Soils readcustomsoils.com. Install an area of 3ft x 3ft x 1ft. below root ball for each shrub pit.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 - 2. Form: Provide lime in form of ground dolomitic limestone.
- B. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.
- C. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.5 to 5.5, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m, having a water-absorbing capacity of 1,000 percent by weight on an oven dry basis.

2.3 FERTILIZERS

- A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 18 percent available phosphoric acid.

- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 10-10-10 or Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Spread soil to total depth of 6 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix lime with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
- D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PROTECTION (WETLAN

- A. Protection Zone: Identify protection zones as identified on Drawings.
- B. Protect designated areas from compaction, disturbance, and vehicular traffic. Prohibit the following practices within these areas:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.

3.4 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

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. Sodding disturbed areas and soil excavate berm.
- B. Related Requirements:

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Sod: From sod vendor for each monostand or mixture, stating the botanical and common name, percentage of each species and variety .

1. Certification of each seed mixture for sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or American Hort.
2. Experience: Five years' experience in turf installation.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Lawn Care Manager.
 - c. Landscape Industry Certified Lawn Care Technician.
5. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in the Turfgrass Producers International's (TPI) "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 1. Spring Planting April 15 through June 15.
 2. Fall Planting August 15 through October 30.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
 1. Species: 25% Bluegrass/75% Fine Fescue.
 2. Acceptable Suppliers:
 - a. Kingston Turf Farm, Kingston RI kingstonturf.com.
 - b. Tuckahoe Turf Farms, tuckahoeturf.com,
 - c. Four Star Farms, Northfield, MA fourstarfarms.com
 - d. Winding Brook Turf Farm, Agawam MA, windingbrookturf.com
 - e. Or equal

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 LIME

- A. Description: Agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent.
- B. Comply with ASTM C602.
- C. Class: T.
 - 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable, or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LIMING AND FERTILIZING

- A. Apply lime at application rate recommended by soil analysis.
- B. Work lime into top 6 inches of soil.
- C. Apply fertilizer at application rate recommended by soil analysis.
- D. Apply fertilizer after smooth raking of topsoil and prior to installation of sod.
- E. Apply fertilizer no more than 48 hours before laying sod.
- F. Mix fertilizer thoroughly into upper 4 inches of topsoil.
- G. Lightly water soil to aid dissipation of fertilizer.

3.4 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
 - 1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.6 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and sod.
 - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
 - 1. Mow to a height of 1-1/2 to 2 inches.
- D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.7 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Engineer:
 - 1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 MAINTENANCE FOR PROVISIONAL ACCEPTANCE

- A. Maintenance shall begin immediately after the entire areas is sodded and miscellaneous disturbed areas are seeded and shall continue until final acceptance. In any case, the minimum period of maintenance for all turf areas shall be 12 weeks after all sod and seed is installed. When all areas have been seeded request an inspection of the work by the Engineer and Owner.
 - 1. After approval by the Engineer the 12-week maintenance period begins.
 - 2. Continue maintenance in all areas until a uniform turf is established over the entire site.
- B. Maintenance shall include reseeding, mowing, watering, weeding and fertilizing.
- C. Watering of seeded and planted areas:
- D. Coordinate settings for the automatic irrigation system with Owner. Contractor shall be responsible to ensure sod and seeded areas are irrigated throughout the maintenance period.
- E. First week: Provide all labor and arrange for all watering necessary for the ground cover and plants to take. In the absence of adequate rainfall, perform watering daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least 4 inches. Do watering early in the day and should not be done during the heat of the day.

- F. Second and subsequent weeks: Water as required to maintain adequate moisture, until final acceptance, in the upper 4 inches of soil.
- G. Watering shall be done in such a manner which will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply 1 complete coverage to the seeded areas in an 8 hour period for each day.
- H. Mowing: The first mowing of sodded areas shall not be attempted until the sod is firmly rooted and secure in place. Not more than 40% of the grass leaf shall be removed by the initial or subsequent mowings. Grass height of the seeded areas shall be maintained between 2 inches and 2 1/2 inches unless otherwise specified. Thereafter, grass shall be maintained at 2 inches until acceptance. Take care not to damage tree trunks, curbs, fencing, utility and irrigation equipment, etc. when mowing. All damages shall be reported to the Engineer, regardless of cause, as soon as possible.
- I. Fertilizing: A second application of fertilizer, as specified herein, shall be applied approximately 6 weeks after installation or as directed by the Engineer. Fertilizer shall be applied at the rate of 3 pounds per 1,000 square feet.
- J. After final acceptance by the Owner, the Contractor will not thereafter be required to do any of the above listed work, except that nothing contained herein shall release the Contractor from his/her obligations under the Contractor.

3.10 PROVISIONAL ACCEPTANCE

- A. Keep all seeded areas watered within the work areas and in good condition, reseeding or replanting areas if and when necessary until a good healthy, uniform growth is established over the entire area, and shall maintain all areas in an approved condition until provisional acceptance.
- B. The Engineer will inspect all work for provisional acceptance at the end of a 12-week maintenance period upon the written request of the Contractor, received at least ten days before the anticipated date of inspection.
- C. The maintenance period must occur during the growing season between April 15 and October 30 and shall include a minimum of 6 mowings.
- D. Satisfactory stand will be defined when the total project area has:
 - 1. No bare spots larger than 4 square inches.
 - 2. No more than 5 percent of total area with bare spots
- E. After inspection has occurred but prior to provisional acceptance, a soil test shall be performed to determine if additional soil fertilizing should occur. If necessary, additional fertilizer not to exceed 3 lbs. per 1000 square feet of 32-5-7 shall be applied as directed by the Engineer.
- F. Furnish full and complete written instructions for maintenance of the seeded areas to the Owner at the time of provisional acceptance.

- G. The inspection by the Engineer will determine whether maintenance shall continue in any area or manner.

After all necessary corrective work and clean-up has been completed, and maintenance instructions have been received by the Owner, the Engineer will certify in writing the provisional acceptance of the seeded areas. The Contractor's responsibilities for maintenance of seeded areas shall cease on receipt of provisional acceptance.

END OF SECTION 329200

SECTION 330513 - MANHOLES AND STRUCTURES

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. Modular precast concrete manhole and structures with tongue-and-groove joints with masonry transition to cover frame, covers, anchorage, and accessories.
 - 2. Bedding and cover materials.

- B. Related Requirements:

- 1. Section 310515 "Soils and Aggregates for Earthwork" for soil and aggregates for backfill in trenches.
 - 2. Section 312000 "Earthwork" for excavating for manholes and structures.

1.3 ACTION SUBMITTALS

- A. Section 013300 "Submittal Procedures" for submittals requirements.
- B. Product Data: Submit cover and frame construction, features, configuration, and dimensions.
- C. Shop Drawings: Indicate manhole and structure locations, elevations, piping, sizes and elevations of penetrations.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate: Products meet or exceed specified requirements.
- B. Manufacturer Instructions: Detailed instructions on installation requirements, including storage and handling procedures.
- C. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.
- D. Qualifications Statements: Qualifications for manufacturer.

1.5 QUALITY ASSURANCE

- A. Perform Work according to Standard Specifications for Highways and Bridges (SSHB), latest edition issued by Massachusetts Department of Transportation (MassDOT) and City of Watertown.
- B. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, at work site, or at both places. Rejected materials shall be replaced at no cost to Owner, and the materials shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein; even though samples may have been accepted as satisfactory at the place of manufacture. Material rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.
- C. At the time of inspection, the materials will be carefully examined for compliance with the ASTM standard specified below and this Section and with the approved manufacturer's drawings. All dry well sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- D. Imperfections in precast concrete sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at 7 days and 5,000 psi at 28 days, when tested in 3-in by 6-in cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Precast concrete sections shall be properly cured prior to loading and shipping. Precast concrete sections shall not be shipped before concrete has attained 3,000 psi compressive strength and not before 5 days after fabrication and/or repair, whichever is longer.
- B. Unload, store, and handle precast manholes and structures according to manufacturer instructions.
- C. Storage: Store precast concrete manholes and structures as to prevent damage to Owner's property or other public or private property.
 - 1. Repair property damaged from materials storage.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.
- B. Cement: ASTM C150, Type II or equal.
- C. Load Rating: HS-20 live load plus the weight of the soil above at 120 pcf.
- D. Reinforcement: The calculated stress in reinforcement closest to a surface in tension at service loads shall not exceed the value in Article 10.6.4.2 of ACI 350-06 and shall not be greater than 50 percent of the specified yield strength f_y , for manholes.
- E. Flotation: Prevent flotation, with ground water level at finished ground surface, by dead weight of manhole or catch basin and soil load above manhole or catch basin. Do not consider skin friction, soil friction or weight of equipment or contents in manhole and catch basin. Flotation safety factor shall not be less than 1.15. If required, provide reinforced concrete "hold-down" slab firmly anchored to the base of the manhole or catch basin with Type 316 stainless steel bolts.
- F. Design of Lifting Devices for Precast Components: According to ASTM C913.
- G. Design of Joints for Precast Components:
 - 1. According to ASTM C913.
 - 2. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.
- H. Shaft Construction: Concentric with concentric cone top section; lipped male/female joints; sleeved to receive pipe sections.
- I. Shape: Cylindrical or Rectangular; as indicated on the Drawings.
- J. Clear Inside Dimensions: As indicated on Drawings.
- K. Design Depth: As indicated on Drawings.
- L. Clear Cover Opening: 30inches<____> inches diameter.
- M. Pipe Entry: Furnish openings as indicated on Drawings.

2.2 MANHOLES AND STRUCTURES

- A. Manufacturers:
 - 1. Substitutions: In accordance with Paragraph 7.05 of the General Conditions.
- B. Manhole and Structure Sections: Reinforced precast concrete according to ASTM C478
 - 1. Gaskets: According to ASTM C923.

- C. Intermediate Landing for Precast Manhole: Reinforced precast concrete according to ASTM C478.
 - 1. Gaskets: According to ASTM C923.
- D. Precast Concrete Grade Rings: Reinforced precast concrete according to ASTM C478.
 - 1. Lipped male/female joints
 - 2. Gaskets: According to ASTM C923
 - 3. Grade rings shall withstand a live load of AASHTO HS20.
- E. Top slabs shall withstand a live load of AASHTO HS20.
- F. Base slab shall be designed for all applicable loading conditions.
- G. Clay Brick Units: ASTM C62, Grade SW solid units.
 - 1. The bricks shall be good, sound, hard and uniformly burned, regular and uniform in shape and size, of compact texture and satisfactory to the Engineer. Underburned or salmon brick will not be acceptable and only whole brick shall be used unless otherwise permitted. In case bricks are rejected by the Engineer, they shall be immediately removed from the site of the work and satisfactory bricks substituted therefore.
 - a. Bricks for channels and shelves shall comply with ASTM C32 for Sewer Brick, Grade SS (from clay or shale) except that the mean or five tests for absorption shall not exceed 8 percent and no individual brick exceed 11 percent.
 - b. Bricks for building up and leveling manhole frames shall conform to ASTM C62.
- H. Mortar and Grout: As specified in Section
 - 1. Type S.
 - 2. Mortar used in the brickwork shall be composed of one part Type II Portland cement conforming to ASTM C150 to two parts sand to which a small amount of hydrated lime not to exceed 10 lbs to each bag of cement shall be added.

2.3 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Manhole frame and covers shall be East Jordan Iron Works; Mechanics Iron Foundry; Neenah Foundry or equal.
 - 2. Construction: ASTM A48, Class 30B cast iron.
 - 3. Surface: Machined flat bearing.
 - 4. Lid: Removable.
 - 5. Cover Design: Sewer manhole covers shall have a diamond pattern, pickholes and the word "SEWER: cast in 3-in letters. Drain manholes shall have the word "DRAIN" cast in 3-in letters.
 - 6. Live Load Rating: H-20 loading plus the weight of coils above as 120 pcf.
 - 7. Sealing gasket where shown on Drawings.

2.4 DIVERTER MANHOLE

- A. Manufacturers:
 - 1. Vortex, or equal.
- B. Manhole Sections: Double wall HDPE.
- C. Top slabs shall withstand a live load of AASHTO HS20.
- D. Base slab shall be designed for all applicable loading conditions.
- E. Actuated butterfly valve integrated.

2.5 MATERIALS

- A. Bedding and Cover:
 - 1. Bedding: Fill Type as specified in Section 310515 “Soils and Aggregates for Earthwork.”
 - 2. Cover: Fill Type, as specified in Section 310515 “Soils and Aggregates for Earthwork.”
 - 3. Soil Backfill from Above Pipe to Finish Grade:
 - a. Soil Type, as specified in Section 310515 “Soils and Aggregates for Earthwork.”
 - b. Subsoil: No rocks over 6 inches in diameter, frozen earth, or foreign matter.

2.6 FINISHES

- A. Steel Galvanizing: ASTM A123. Hot dip galvanize after fabrication.

2.7 ACCESSORIES

- A. Manhole and Structure Steps:
 - 1. Formed Steel-Reinforce Plastic rungs M.A. Industries Type PS2-PF-SL or equal.
 - 2. Formed integral with manhole and structure sections.
 - 3. Diameter: 3/4 inch.
 - 4. Width: 14 inch.
 - 5. Spacing: 16 inch o.c. vertically, set into manhole and structure wall.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 “Execution” for installation examination requirements.
- B. Verify that items provided by other Sections of Work are properly sized and located.

- C. Verify that built-in items are in proper location and ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

- A. Section 017300 “Execution” for installation preparation requirements.
- B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- D. Do not install structures where Site conditions induce loads exceeding structural capacity of structures.
- E. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. Excavation and Backfill:
 - 1. Excavate manholes and structures as specified in Section 312000 “Earthwork” in location and to indicated depth.
 - 2. Provide clearance around sidewalls of structure for construction operations.
 - 3. When groundwater is encountered, prevent accumulation of water in excavations; place manholes and structures in dry trench.
 - 4. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation as approved by Engineer.
- B. Place manhole and structure sections plumb and level, trim to correct elevations, and anchor to base pad.
- C. Backfill excavations for manholes and structures as specified in Section 312000 “Earthwork.”
- D. Form and place manhole and structures cylinder plumb and level and to correct dimensions and elevations.
- E. Cut and fit for pipe.
- F. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour as indicated on Drawings.
- G. Set cover frames and covers level without tipping and to correct elevations.
- H. Coordinate with other Sections of Work to provide correct size, shape, and location.
- I. Precast Concrete Manholes and Structures:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Set precast structures bearing firmly and fully on crushed stone bedding, compacted as specified in Section 312000 "Earthwork" or on other support system as indicated on Drawings.
4. Assemble multi-section structures by lowering each section into excavation; set level and firmly position base section before placing additional sections.
5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
6. Maintain alignment between sections by using guide devices affixed to lower section.
7. Joint sealing materials may be installed on Site or at manufacturer's plant.
8. Verify that installed manholes and structures meet required alignment and grade.
9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
10. Cut pipe flush with interior of structure.
11. Shape inverts through manhole and structures as indicated on Drawings.

3.4 FIELD QUALITY CONTROL

A. Section 017300 "Execution" for testing, adjusting, and balancing requirements.

B. Leakage Tests:

1. Performed on every manhole with Engineer observing.
2. Preparation:
 - a. Prior to placing the shelf and invert, and pointing the horizontal joints, fill all lifting holes within 6 feet of ground surface with approved non-shrinking mortar.
 - b. Lower groundwater table as required.
 - c. Plug all pipes and other openings into manhole.
3. Test:
 - a. Fill water to top of cone section.
 - b. Observe for visible water in the excavated area.
 - c. If area around manhole is backfilled or the test is unsatisfactory, repeat the test allowing for suitable time for absorption of water in the excavated area.
 - d. At the end of the absorption period, refill manhole and wait 8 hours.
 - e. Refill the cone at the end of 8 hours, measuring the amount required to refill.
 - f. Extrapolate to determine 24-rate of leakage. Do not allow leakage to exceed 1 gallon per vertical foot in a 24-hour period.
 - g. Engineer will perform visual inspection along with the Contractor.
4. Repair:
 - a. If leakage is less than 3 gallons per vertical foot per 24 hours, make approved repairs to the manhole and retest, if it is determined the leakage is due to defects in the joints or sections.

- b. If leakage is 3 gallons or more, then replace the entire manhole, including all joints and sections at the Contractor's expense. Retest the new manhole as described above.
- C. A vacuum test may be substituted for a leakage test as follows:
 1. The filling and pointing of exterior joints are not required where the excavation has not been backfilled.
 2. Inflate to affect a seal between the vacuum base and the top of the manhole.
 3. Connect the vacuum pump to the outlet port with the valve open and a vacuum of 10" Hg (20" of Hg absolute) drawn.
 4. Close the valve.
 5. The following test criteria shall apply to 4-ft and 5-ft diameter manholes:
 - a. Allowable drops in pressure:
 - 1) Manholes 0 – 10 ft. deep:
 - a) Drop of 1" Hg over 2 minutes.
 - 2) Manholes 10 -15 ft. deep:
 - a) Drop of 1" Hg over 2-1/2 minutes.
 - 3) Manholes 15 - 30 feet:
 - a) Drop of 1" Hg over 3 minutes.
 6. If the pressure drop exceeds the acceptable limits, make necessary repairs as approved by the Engineer, and:
 - a. Re-test the manhole.
 - b. If the manhole fails to meet the minimum requirements of the vacuum test retest using the leakage test.
 7. Upon completion of a successful vacuum test, the interior and exterior joints shall be filled and pointed.

3.5 CLEANING

- A. Clean all new manholes to be free of silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION 330513

SECTION 330519 - DUCTILE-IRON UTILITY PIPE FOR WATER SERVICE

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. Materials, equipment and incidentals required to install and test ductile iron pipe and fittings for piping as shown on Drawings and as specified.
 - a. The word "pipe" is used to refer to pipe, fittings, or appurtenances unless otherwise noted.
- 2. Yard Piping: Includes piping in valve vaults, manholes, cleanouts and similar yard structures.
- 3. Locate piping as shown on the Drawings. The Engineer reserves the right to make modifications in locations as may be found desirable to avoid interference between pipes or for other reasons.

- B. Related Requirements:

- 1. Section 310515 "Soils and Aggregates for Earthwork" for granular fill.
- 2. Section 312500 "Erosion and Sedimentation Controls."
- 3. Section 321216 "Asphalt Paving."

1.3 COORDINATION

- A. Section 013100 "Project Management and Coordination" specifies requirements for coordination.

1.4 ACTION SUBMITTALS

- A. Section 013300 "Submittal Procedures" for submittals requirements.

- B. Shop Drawings and Product Data:

- 1. Including piping layouts, design calculations, warranty information, test reports, in accordance with Section 013300 "Submittal Procedures" and referenced standards.
- 2. Design calculations in accordance with "Pipe Wall Thickness Analysis" Paragraph under Part 2 Products, signed by a Professional Engineer, as noted in Section 013300 "Submittal Procedures".

3. Name of pipe and fitting suppliers and a list of materials to be furnished.
4. Anticipated production and delivery schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Prior to Pipe Shipment:

1. Certified copies of mill tests confirming type of materials used in pipe, and shop testing of pipe to show compliance with requirements of applicable standards, along with a sworn affidavit of compliance that pipe complies with referenced standards.
2. Certified affidavit of compliance from manufacturer stating that pipe, fittings, gaskets, linings and exterior coatings for project have been manufactured and tested in accordance with AWWA and ASTM standards and requirements specified herein.

B. Copies of shop tests, including hydrostatic tests.

C. Handling Procedures: For all phases from finished fabrication through delivery including storage, transportation, loading, and unloading. This will include storage at project site and required protection following installation prior to startup.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Watertown standards.

B. Hydrostatically tested at point of manufacture to 500 psi for a duration of 10 seconds per AWWA C151. Testing may be performed prior to machining bell and spigot.

1. Test Failure: Defined as any leak or rupture of pipe wall.
2. Certified test results furnished in duplicate to Engineer 5 days prior to shipment.

C. Pipe and Fittings:

1. Inspected and tested at foundry as required by specified referenced standards.
2. Certified test results furnished in duplicate to Engineer 5 days prior to shipment.

D. Inspection of Pipe and Fittings After Delivery: By Engineer or representative of Owner.

1. Pipe and fittings subject to rejection if failing to meet specified requirements even though pipe may have been accepted as satisfactory at the place of manufacture.
2. Pipe rejected after delivery (including defects from manufacturing or delivery/transport) to be marked for identification and immediately removed from the job.

E. Pipe and fittings installed under this Contract may be inspected at the factory for compliance with this Section by an independent testing laboratory selected by Owner at Owner's expense.

F. Manufacturer's Representative:

1. Made available to Owner and owner's representative during the manufacturing, furnishing, transporting, and unloading of pipe, as well as during installation and testing

- of pipe to assist in insuring that pipe is properly fabricated, transported, unloaded, stored in the field, joined and tested.
 2. Manufacturer's responsibilities relate only to the proper care and treatment of pipe during these procedures and not techniques or procedures used during installation and testing.
 3. Available at any time the Owner may request. A minimum of [10] working days (time on site) during the project when requested by Owner.
 4. Cost for services of the factory representative, including expenses, to be considered incidental to the project and will not be paid separately.
- G. Pipe and fittings marked in accordance with all applicable AWWA standards. Legibly and permanently mark pipe, fittings, specials and appurtenances to be consistent with the laying schedule and marking drawings (if required) with the following information:
1. Manufacturer.
 2. Date of manufacture.
 3. Size, type, class, or wall thickness.
 4. AWWA Standard(s) produced to.
 5. Pipe identified with sequential numbering consistent with the laying schedule and marking drawings and each marked pipe will appear on the marking drawings in the identified location for installation.
 6. Special fittings, bends, and appurtenances requiring specific orientation will be appropriately marked with words "TOP" in correct position and in a consistent location.

1.7 QUALIFICATIONS

- A. Manufacturer shall meet the following criteria and furnish necessary project information, which demonstrates required experience:
1. Experience that includes successful fabrication (followed by installation, acceptance and service) to AWWA C151 standards of at least largest specified diameter or larger ductile iron pipe with similar linings/coatings within the past 5 years.
 2. Experience to include successful fabrication of at least 50 fittings in compliance with AWWA C110 or C153 of largest specified diameter or larger with similar lining/coatings within the past 5 years.
 3. Experience that includes successful fabrication (followed by installation, acceptance and service) of at least largest specified diameter or larger push-on style, boltless restrained joint for ductile iron pipe within the last 5 years.
- B. Pipe Origin: Manufactured in the United States.
- C. Fittings Origin: Manufactured in or outside the United States, but supplied by one of the named pipe fitting manufacturers in Part 2. Written certification fittings are compatible with the supplied brand of pipe.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Per AWWA C600 and referenced AWWA Standards for shipping, handling and storage procedures.

1. Deliver materials in manufacturer's packaging including application instructions.
2. Handle to prevent injury to pipe, pipe linings and pipe coatings.
 - a. Examine pipe and fittings as noted in Division 01. Damage to linings or coatings discovered during examination to be repaired to the satisfaction of Engineer before proceeding with work.
3. Transport pipe to job site on padded bunks or oak timbers and secured with steel banding or nylon tie down straps adequately protecting pipe and coating.
 - a. Handle pipe using slings, hooks, pipe tongs or other devices acceptable to Engineer.
 - b. Do not use non-cushioned ropes, chairs, wedges, cables or levers when handling finished pipe, fittings or couplings.
 - c. Do not drop pipe or fittings.
 - d. Do not skid pipe or fittings against each other.
 - e. Do not mar pipe or fitting coatings.
 - f. Utilize padded wooden pipe cradles, or chocks suitable for protecting coatings between and beneath finished pipes when pipes are placed upon rough surfaces.

B. Storage:

1. Do not store pipe on bare ground unless soft sand berms are used to support pipe and is approved by Engineer.
2. Keep materials safe from damage if stored. Interior of pipe, fittings and other appurtenances to be kept free from dirt, excessive corrosion or foreign matter.
3. Do not stack pipe higher than limits recommended by manufacturer. Keep bottom tier off ground using timbers, rails, or concrete. Stacking to conform to manufacturer's recommendations and/or AWWA C600.
4. Store gaskets for mechanical and push-on joints in a cool location out of direct sunlight; not in contact with petroleum products. Use gaskets on a first-in, first-out basis.

C. Protection:

1. Lined and coated pipe: Suitably protected from exposure and heating from sun. Follow procedures recommended by coating and lining system manufacturer.
 - a. Exposure will not be allowed except for short periods such as installation, assembly and repairs.
2. Metal tools or heavy objects are not permitted to come in contact unnecessarily with finished coating.
 - a. Workers may walk on coated pipe only when necessary, and only when wearing footwear with rubber or composition soles and heels sufficiently free of dirt and mud so coating remains undamaged.
3. Prevent damage to linings and coatings caused by handling, onsite storage, and exposure to low temperatures (due to embrittlement), high temperatures, or direct sunlight.

1.9 EXISTING CONDITIONS

- A. Field Measurements: Verify field locations and sizes of connections to existing piping and equipment prior to submitting pipe lay drawings.
 - 1. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Furnish one year manufacturer's warranty for ductile iron pipe and fittings.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Assure compatibility between joints of all items supplied.
- B. Manufacturers: Provide pipe and fittings supplied by:
 - 1. American Cast Iron Pipe Co.
 - 2. U.S. Pipe and Foundry.
 - 3. Griffin Pipe Products.
 - 4. McWane Company; all pipe divisions.
 - 5. An approved equivalent member of the Ductile Iron Pipe Research Association (DIPRA).
- C. Fitting Certification: From fitting manufacturer; written certification that fittings are compatible with supplied brand of pipe.
- D. Ductile Iron Pipe: Per AWWA C151. Provide in standard lengths as much as possible.
- E. Thickness Design: Per AWWA C150:
- F. Thickness Design: Ductile iron pipe meeting minimum wall thickness and pressure class indicated on Drawings.
- G. Gravity Sewer Piping: Per ASTM A746.
- A. Culvert Piping: Per ASTM A716.
- H. Pipe Wall Thickness Analysis:
 - 1. Tensile strength: 60,000 psi.
 - 2. Yield strength of 42,000 psi (per AWWA M-41).
 - 3. Design and analyze external and internal pressures separately. Use the larger of two to determine the net design thickness.
 - 4. Design additional allowances for service allowance and casting tolerance per AWWA C150.
 - 5. Design net thickness for external loading based on the greater of the following conditions:

- a. Cover: 30 inches with HS-20 wheel loads per AASHTO Standard Specifications for Highway Bridges, with an impact factor of 1.5.
 - b. Depth from existing ground level or future proposed grade, whichever is greater, to top of pipe as shown on Drawings, with truck load.
 - c. Soil Density: 125 lbs per cu ft
 - d. Laying Conditions: Per AWWA C150, Type 2.
6. Design net thickness based upon the following internal pressure conditions:
 - a. Design Pressure: 150 psi
 - b. Surge Allowance: 100 psi.
 - c. Safety Factor: 2.
 - d. Total Internal Pressure Design: 250 psi.
 - e. E': 300 psi.
7. Furnish to Engineer for approval, copies of design calculations showing pipe meets the specified requirements during shop drawing review in accordance with Section 013300 "Submittal Procedures".

2.2 END TREATMENTS/JOINTS

1. Unrestrained Pipe and Fitting Joints: Push-on rubber gasket type per AWWA C111.
2. Restrained Pipe and Fitting Joints: Push-on rubber gasket, locking ring type joints per manufacturer' standard described below, except where flange joints are shown on Drawings.
3. Gasket materials: Per Table 5-1 of AWWA M-41.
 - a. Rubber-Gasket Joints: Per AWWA C111.
4. Restraints for push-on joint pipe and fittings to be positive locking, utilizing restraints independent of joint gasket.
 - a. Joint Fabrication: Heavy section ductile iron casting.
 - b. Bolts and Nuts: Low carbon steel conforming to ASTM A193, Grade B7.
 - c. Restraint for mechanical joint pipe shall use retainer glands for restraining joint.
5. Provide restrained push on joints from one of the following manufacturers or an Engineer approved equivalent.
 - a. US Pipe and Foundry Company: "TR Flex."
 - b. American Cast Iron Pipe Company: "Lok-Ring" or "Flex Ring (positive locking style)."
 - c. Griffin Pipe Products Company: "Snap Lok."
 - d. Clow Water Systems Company: "Superlok."
6. Determine minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe from length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resistance friction with soil.
 - a. Required lengths of restrained joints shall be as shown on Drawings.

7. Restrained pipe joints incorporating cut out sections in pipe wall must have a minimum wall thickness at cut out corresponding with minimum specified wall thickness for the rest of pipe.
8. Pipe manufacturer proprietary mechanical joint restraint systems that utilize a wedge-style gripping system or a gland/ring positive restraint system will be considered acceptable on a case-by-case basis as determined by Engineer.
 - a. Optional mechanical joint restraint shall be incorporated in the design of a follower gland. Gland shall be manufactured of ductile iron per ASTM A536. Dimensions of gland must be such that it can be used with standard mechanical joint bell and tee-headed bolts, as specified with pipe.
 - b. Restraint Mechanism:
 - 1) Individually activated gripping surfaces maximizing restraint capability.
 - 2) Wedges designed to spread bearing surfaces on pipe.
 - 3) Torque limiting twist-off nuts. When nut is sheared off, standard hex nut shall remain.
 - c. Restraint Device for Ductile Iron Pipe: EBAA Iron Megalug Series 1100, or approved equivalent.
 - 1) Working Pressure: 250 psi and a safety factor of 2:1.
9. Threaded Ductile Iron Flanges
 - a. Fabricated per AWWA C115 and sealed during installation with a special high pressure, full face gasket per AWWA C111.
 - b. At pipe manufacturer's option, use of 250 lbs pattern flanges, faced and drilled in accordance with ANSI B16.1 may be substituted in order to match valves or other equipment or to meet required working pressure requirements.
 - c. Flanges:
 - 1) Rated for same pressure as adjacent pipe in all cases.
 - 2) Compatible with 250 lbs class and higher special class AWWA valves.
 - 3) Pre-drilled and faced after being screwed onto pipe.
 - 4) True to 90 degrees of pipe axis and shall be flush with end of pipe.
 - d. Gaskets: Full face rubber, 1/8 inch thick SBR material.
 - 1) American Torseal Gasket, or equal.
 - 2) Special material ring gaskets such as those by Garlock or equivalent may be required if pressures exceed 250 psi for ANSI rated and custom flanges.
 - e. Flanged joints:
 - 1) Supplied with bolts and nuts on one end.
 - 2) Bolt studs with a nut at each end, or studs with nuts on one end where flange is tapped.
 - 3) Quantity and size of bolts to comply with corresponding flange standard.
 - 4) Bolts and Nuts: Per ASTM A193, grade B7.

- f. Blind flanges shall mate with regular flanges.
 - g. Filler flanges and beveled flange fillers shall be furnished faced and drilled complete with extra length bolts.
- 10. Couplings and Adapters Sleeve Type Couplings: Dresser Style 38, 138 or equivalent by:
 - a. Ford Meter Box Co.
 - b. Smith Blair
 - c. Romac Industries.
- 11. Buried Sleeve-Type Couplings: Protective wrapping of "Denso" material by DENSO Inc. of Texas or equivalent.
 - a. Where "Denso" material is used, pack joint with "Densyl mastic" to give an even contour for wrapping with "Densopol" tape.
 - b. Apply a 1/16 inch thick coating of "Denso" paste followed by 4 inch or more wide "Densopol" tape wound spirally around joint with at least 50 percent overlap.

2.3 FITTINGS

- 1. Pipe Fittings: Ductile iron per AWWA C110 or AWWA C153 as applicable. Fittings to have the same pressure rating, as a minimum, of the connecting pipe.
 - a. Piping 24 inch and smaller: minimum pressure rating of 350 psi.
- 2. Closures: Made with mechanical joint ductile iron solid sleeves. Locate in straight runs of pipe at minimum cover outside the limits of restrained joint sections; subject to approval of Engineer.
- 3. Weld-on Outlets: May be used as an alternative to ductile iron cast fittings. Limited to branch outlets having a nominal diameter not greater than 30 percent of nominal diameter of main pipe, or 14 inches diameter, whichever is smaller.
 - a. May be provided as radial tee outlet, tangential outlet, or lateral outlet fabricated at a specific angle to main pipe (in 1 degree increments between 45 and 90 degrees from axis of main pipe).
 - b. Welded onto pipe under supervision of a qualified welder at same facility where pipe is manufactured. Pipe manufacturer to have 5 years' experience in fabrication and testing of outlets of similar size and configuration. Field welding of outlets is not acceptable.
 - c. Joints to be compatible with connecting pipe and meet where applicable, requirements of ANSI/AWWA C111/A21.11 and/or ANSI/AWWA C115/A21.15.
 - d. Welding Procedures: As determined by pipe manufacturer.
 - 1) Parent pipe and branch outlet candidate pipe shall be centrifugally cast ductile iron pipe.
 - a) Designed per ANSI/AWWA C150/A21.50
 - b) Manufactured per ANSI/AWWA C151/A21.51.
 - c) Minimum class for sizes 4 through 54 inch; special thickness class 53.

- e. Rated for working pressure indicated on Drawings and connecting pipe.
- f. Prior to application of coating or lining in outlet area, weldments for branch outlets supplied for this project will be subjected to an air pressure test of 15 psi. Rating, safety factor and testing must be certified and contained in manufacturer's submittal package.

2.4 LININGS, COATINGS & CORROSION PROTECTION

A. Interior Lining:

- 1. Ductile iron pipe and fittings shall have same type of lining.
- 2. Cement Mortar Lining: Per AWWA C104 double thickness. Cement type per ASTM C150.
 - a. At Supplier's Option: Fittings may be lined per AWWA C550; NSF/ANSI 61 certified.
- 3. Pipe and Fittings: Fusion-bonded epoxy lining per ANSI/AWWA C116/A21.16 and AWWA C550; NSF/ANSI 61 certified.
- 4. Where indicated: Pipe and Fittings will have glass lining in accordance ASTM B1000.
 - a. Pipe and Fittings: Special thickness class 53 or greater.
 - b. Joints: Flanged.
 - c. Glass Lining: Smooth, continuous coating. Free of pin holes, crazing or fish scales
 - 1) Supplier: Ferroch; Permutit or Engineer approved equivalent.
 - 2) Thickness, Average: 10 mils.
 - 3) Thickness, Minimum: 8 mils.
 - 4) Thickness Measurement: Mikrotest; Elcometer or Engineer approved equivalent magnetic thickness gauge.
 - 5) Surface Hardness: Greater than 5 on MOHS scale.
 - 6) Density: 2.5 grams/cc minimum.
 - 7) Compressive Strength: 30,000 psi minimum.
 - 8) Lining Continuity: Verified by means of an approved "holiday" detector of low-voltage, wet sponge, transistorized type.
 - 9) Weight Loss: Not more than 3 mils per square inch when tested in a range of 500 degrees F U.S. Bureau of Standards, Standard T Section Thermal Shock Tests.
 - d. Certified Test Reports: Furnish to Engineer.
- 5. Pipe and Fittings: Lined with ceramic-filled amine-cured epoxy, Protecto 401 by Induron.
 - a. Lining thickness: 40 mils minimum.
 - b. Application: By coating manufacturer approved applicator per manufacturer's instructions, under controlled conditions at applicator's shop or pipe manufacturer's plant.
 - c. Applicator: Certified affidavit of compliance with manufacturer's instructions and specified requirements submitted prior to performing Work.

B. Exterior Coating

1. Buried pipe installed with bituminous coating per AWWA C151 and C110 respectively.
2. Install buried pipe with polyethylene encasement.
 - a. Polyethylene Encasement: 8 mils thickness meeting standards per AWWA C105.
 - 1) Three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single thickness not less than eight mils. Infuse inside surface in contact with pipe exterior with an antimicrobial compound and volatile corrosion inhibitor blend, mitigating microbiologically influenced corrosion galvanic corrosion.
 - 2) Polyethylene encasement shall be V-Bio, as patented by DIPRA.
 - b. Manufacturers:
 - 1) North Town Company.
 - 2) AA Thread and Seal Tape, Inc.
 - 3) Sigma Corp.
 - 4) Or equal.
 - c. Size Requirements: Per TABLE 3, section 2.15 of DIPRA's Installation Guide for Ductile Iron Pipe.
 - d. Test Results: Submitted to Engineer for approval prior to use.
 - 1) Testing: Independent testing agency certifying polyethylene encasement meets criteria established by AWWA C105 associated with tensile strength, elongation, dielectric strength, impact resistance, and propagation tear resistance.
 - 2) Samples: Include with test results.
 - e. Plastic Adhesive Tape: 2 inch for sealing seams, cuts, or tears in polyethylene encasement. Duct tape is not acceptable.
 - 1) Calpico Vinyl
 - 2) Polyken
 - 3) U.P.C.
 - 4) Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 "Execution" for installation examination requirements.

3.2 PREPARATION

- A. Section 017300 "Execution" for installation preparation requirements.

- B. Handle piping and fittings per “Delivery, Storage, and Handling” Article in Part 1 of this specification.
- C. Examine pipe and fittings before laying. Repair all damage to pipe, lining or coatings per manufacturer's recommendations prior to installation.
- D. Interior of all pipe, fittings and other appurtenances shall be kept free from dirt, excessive corrosion or foreign matter at all times.

3.3 INSTALLATION

- A. Installed per requirements of AWWA C600, unless otherwise specified.
 - 1. Provide firm, even bearing length of pipe. Dig bell holes at each joint. Tamp backfill materials on pipe sides to springline per details on Drawings.
 - 2. Blocking is not permitted.
 - 3. Replace with sound pipe or fitting, defective pipe or fitting discovered after having been laid.
 - 4. When laid, pipe and fittings shall perform to lines and grades required. When laying is not in progress, close open ends of pipe with watertight plug or other approved means.
 - 5. Place sufficient backfill to prevent flotation. Joint deflection not to exceed manufacturer's recommendation.
 - 6. Pipe Laid Underground: 3 feet cover unless Drawings show otherwise or otherwise specified.
 - 7. Lay pipe such that invert elevations shown on Drawings are not exceeded.
 - 8. Provide fittings, in addition to those shown on Drawings, where required, in crossing utilities which may be encountered upon opening trench. Install solid sleeve closures at locations approved by Engineer.
 - 9. Pipe Interior: Maintain dry and broom clean throughout construction period.
 - 10. Field Cutting Pipe: When required, smooth cut by machine perpendicular to pipe axis. Bevel cut pipe ends per manufacturer's recommendations for spigot end.
 - a. Repair coating removed from cut per manufacturer's recommendation and/or coating and lining paragraphs of Part 2 above (whichever method is more stringent in opinion of Engineer).
 - b. Cement lining shall be undamaged.
 - c. Cutting of restrained joint pipe will not be allowed, unless approved at specific joints in conjunction with use of restrainer glands by EBAA Iron or field adaptable restrained joints.
 - d. Where Field Cuts are Permitted” Pipe supplied by factory as "gauged full length".
 - 1) Gauged Full Length Pipe is Unavailable: Pipe to be field gauged at location of new spigot using a measuring tape, or other means approved by manufacturer, to verify that diameter is within tolerances permitted in Table 1 of AWWA C151.
- B. Jointing Ductile-Iron Pipe:
 - 1. Push-On Joints: Install per manufacturer's instructions, AWWA C600 and Appendix B of AWWA C111. If there is conflict, manufacturer's instructions take precedence.

- a. Lay pipe with bell ends looking ahead.
 - b. Insert rubber gasket in groove of bell end of pipe.
 - c. Clean and lubricate joint surfaces
 - d. Align plain end of pipe with bell of pipe to which it is to be joined and pushed home.
 - e. Metal feeler shall be used to make certain that rubber gasket is properly seated.
2. Mechanical Joints: Assembled per manufacturer's instructions, AWWA C600 and Appendix A of AWWA C111. If there is conflict, manufacturer's instructions take precedence.
 - a. Lay pipe with bell ends looking ahead.
 - b. Clean and lubricate joint surfaces and rubber gasket.
 - c. Tighten bolts to specified torques.
 - d. Extension wrenches or pipe over handle of ordinary ratchet wrench are not allowed to secure greater leverage.
 - e. Encapsulate bolts and nuts using wax sealing tape per AWWA Standard C217.
 - f. Install polyethylene encasement as specified.
3. Bolts in Mechanical or Restrained Joints: Tightened alternately and evenly.
4. Restraint for Mechanical Joint Pipe:
 - a. Retainer glands for restraining joint.
 - b. Restrained mechanical joints to be suitable for specified test pressure.
 - c. Installed according to pipe manufacturer's instructions.
5. Flanged Joints: Assembled per manufacturer's instructions and Appendix C of AWWA C111. If there is conflict, manufacturer's instructions take precedence.
 - a. Ensure there is no restraint on opposite ends of pipe or fitting, which would prevent uniform gasket compression, cause unnecessary stress, bending or torsional strains, or distortion of flanges or flanged fittings.
 - b. Adjoining push-on joints are not to be assembled until flanged joints have been tightened.
 - c. Tighten flange bolts for uniform gasket compression and sealing.
 - 1) Leave flange bolts with approximately 1/2 inch projection beyond nut face after tightening.
 - d. Encapsulate bolts and nuts using wax sealing tape per AWWA Standard C217.
6. Sleeve Couplings: Only installed for closure or as shown on Drawings. Do not assemble couplings until adjoining joints have been assembled.
 - a. Encapsulate bolts and nuts using wax sealing tape per AWWA Standard C217.
 - b. Install protective wrap recommended by manufacturer or as required herein. Maintain insulating properties of insulating and dielectric couplings.
7. Blowoffs, outlets, valves, fittings and other appurtenances to be set and jointed as indicated on Drawings and per manufacturer's instructions.

C. Polyethylene Encasement:

1. Install polyethylene encasement around ductile iron pipe to limits shown on Drawings and in accordance with pipe manufacturer's recommendations.
 - a. Installed per ANSI/ AWWA C105/A21.5, Method 'A' in accordance with section 2.15 of DIPRA's Installation Guide for Ductile Iron Pipe.
2. Use a fabric type or padded sling when handling pipe to prevent damage to encasement.
3. Seal seams with approved 2 inch wide plastic adhesive tape.
4. Repair encasement rips or tears with tape and film per ANSI/AWWA C105/A21.5.
5. When backfilling do not damage polyethylene encasement.

D. Cathodic Protection Systems:

1. Joints: Electrically bonded with bonding wire and brazing cartridges per Section <Insert section number>.
2. Factory applied copper conductivity straps may be used in lieu of field applied bonding wire.

3.4 CONNECTIONS TO STRUCTURES

- A. Where pipe 3-inch diameter or larger horizontally passes from concrete to earth, install two flexible joints spaced 2 to 4 feet apart depending on pipe size within 2 feet of exterior wall face, whether shown on Drawings or not.
- B. Utilize wall sleeves for pipes passing through walls designed to pass through wall via restrained piping unless otherwise specified.
- C. Encase piping underneath structures in reinforced concrete as shown in Drawings.

3.5 FIELD QUALITY CONTROL

- A. Replace with sound pipe or fitting, defective pipe or fitting discovered after having been laid.
- B. Thoroughly clean pipe and fittings before laying. Keep clean until used in Work.
- C. Pipe and fittings, when installed or laid, shall conform to lines and grades required.

3.6 FILLING AND TESTING

1. After Installation: Test pipe shall for compliance as specified.
 - a. Furnish necessary equipment and labor for hydrostatic pressure testing pipelines.
 - b. Submit detailed test procedures and methods per AWWA C600 for Engineer's review and approval at least 10 days prior to testing
2. Pressure Pipelines: Subjected to hydrostatic pressure of 1.25 times working pressure at highest point along test segment.

- a. Maintained test pressure for 2 hours.
 - b. Hydrostatic testing allowances are not to exceed those indicated in AWWA C600.
 - c. Provide suitable restrained bulkheads as required to complete specified hydrostatic testing.
 - d. Make taps and furnish necessary caps, plugs, etc., required to conduct testing.
3. Gravity Pipelines: Subjected to hydrostatic pressure test as specified in AWWA C600.
4. Valves and Valve Boxes” Properly located, installed and operable prior to testing.
5. Provide bulkheads with a sufficient number of outlets for filling and draining line and for venting air.
6. Hydrostatic Pressure Tests: Per Section 5.2 of AWWA C600.
 - a. Furnish gauges, meters, pressure pumps and other equipment required to slowly fill line and perform required tests.
7. Pressure Test Duration: 2 hours.
 - a. Repair leaks evident at surface regardless of total leakage as shown by test.
 - b. Repair lines failing to meet tests. Retest as necessary until test requirements are met.
 - c. Defective materials, pipes, valves and accessories shall be removed and replaced.

3.7 CLEANING

- A. Sections 017300 “Execution” and 017700 “Closeout Procedures” for cleaning requirements.
- B. At conclusion of Work, thoroughly clean pipes by flushing with water or other means to remove dirt, stones, pieces of wood, or other material which may have entered during construction period. Remove all debris from pipeline. Lowest segment outlet shall be flushed last to assure debris removal.
- C. After pipes have been cleaned and if groundwater level is above pipes or water in pipe trench is above pipe following a heavy rain, Engineer will examine pipe for leaks.
 1. Repair and replace defective pipes, fittings or joints that are discovered.
- D. Potable Water Service: Disinfect ductile iron pipe used for potable water service after cleaning. Provide necessary equipment and labor.
 1. Disinfection per AWWA C651 standard.
 2. Discharge chlorinated water in compliance with Federal, State and local standards. Provide sodium bisulfite for de-chlorination prior to discharge.

3.8 PROTECTION

- A. Section 017300 “Execution” and Section 01770 “Closeout Procedures” for protecting finished Work requirements.

END OF SECTION 330519

3.9 EXHIBIT A

Use as a reference

INTERIOR LININGS AVAILABLE FOR DUCTILE IRON PIPE

Description	Max./ Service (1) Temp. (Degrees F)	Common Uses	Thickness
CEMENT MORTAR (AWWA C104)			
With Sealcoat	150 degrees	Salt water	
Without Sealcoat	212 degrees	Drinking Water Non-Septic Gravity Sewers Sanitary sewers Force Mains	Standard per AWWA C104 or double
GLASS			
		Scum	10 Mil (nominal)
PETROLEUM ASPHALT COATING			
	150 degrees	Air	1 Mil
PROTECTOR 401 (CERAMIC-FILLED AMINE-CURED EPOXY)	120-150 degrees (2)	Septic sewers Acids (3) Alkali Waste Pickling brine	40 Mil (nominal)
EPOXIES SUITABLE FOR DRINKING WATER (4)	120-150 degrees (2)	Drinking Water Food Processing	24 Mil (minimum)
POLYETHYLENE	120-150 degrees (5)	Septic Sewers Acids (3) Alkali Waste Pickling Brine	40 Mil (nominal)

- (1) Maximum service temperatures listed are intended as general guidelines. For higher service temperatures, consult manufacturer for specific recommendations.
- (2) Maximum service temperatures for epoxies depends on service conditions and specific formulation. Consult manufacturer for recommendations for elevated temperature service.
- (3) Consult manufacturer for specific acid service use.
- (4) All epoxies are not suitable for conveying drinking water. Consult manufacturer for recommendations. Many jurisdictions require NSF 61 certifications for linings in contact with drinking water."
- (5) Maximum service temperature for polyethylene for acids and alkali waste depends on specific acid or alkali waste and service condition(s). consult manufacturer for recommendations for elevated temperature service.

3.10 EXHIBIT B

EXHIBIT B

Use as a Reference

GASKET MATERIALS USED FOR DUCTILE IRON PIPE IN WATER AND SEWERAGE SERVICE

Description	Maximum Service(1,2) Temperature (Degrees F)		Common Uses(3)
	Push-On Gaskets Joint Gaskets	Mechanical	
SBR (Styrene Butadiene)	150 Degrees	120 Degrees	Fresh Water Salt Water Sanitary Sewage
EPDM (Ethylene Propylene)	250 Degrees	225 Degrees	Fresh Water Salt Water Sanitary Sewage Hot Water
Nitrile (NBR) (Acrylonitrile Butadiene)	150 Degrees	120 Degrees Fats, Oils Greases Chemicals	Hydrocarbons
Neoprene(R) (CR) (Polychloroprene)	200 Degrees	200 Degrees Salt Water Sanitary Sewage	Fresh Water
Viton(R); Fluorel(R) (FPM) (4) (Fluorocarbon)	300 Degrees	225 Degrees Acids Petroleum Vegetable Oils	Hydrocarbons

- (1) Maximum service temperatures listed are intended as general guidelines for ductile iron pipe gaskets. For service temperatures greater than those listed, consult manufacturers for specific recommendations.
- (2) Minimum service temperature is not usually a meaningful parameter for piping gaskets; however, low temperatures during pipeline installation may necessitate precautions. Consult manufacturer for pertinent recommendations.
- (3) Water, including sanitary sewage, with low levels of the listed contaminants.

SECTION 331200 - WATER UTILITY DISTRIBUTION EQUIPMENT

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. Reduced-pressure backflow preventer assemblies.
 - 2. Double check valve backflow preventer assemblies.
 - 3. Valves.

- B. Related Requirements:

- 1. Section 310515 "Soils and Aggregates for Earthwork" for aggregate for backfill.
 - 2. Section 312000 "Earthwork" for excavating for backflow preventer assemblies.
 - 3. Section 331300 "Disinfecting of Water Utility Distribution" for disinfection of domestic water piping beyond backflow preventer valve vault.

1.3 DEFINITIONS

- A. NRS: Non-rising stem.
- B. OS&Y: Outside screw and yoke.

1.4 PREINSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing Work of this Section.

1.5 ACTION SUBMITTALS

- A. Section 013300 "Submittal Procedures" for submittals requirements.
- B. Product Data:
 - 1. Data on backflow preventer assemblies.
 - 2. Piping: Data on pipe materials, fittings, and accessories.

3. Valves: Manufacturers catalog information with valve data and ratings for each service.
4. Supports: Manufacturers catalog information including load capacity.

1.6 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- B. Manufacturer Instructions: Installation instructions for backflow preventer assemblies, valves, and accessories.
- C. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.
- D. Qualifications Statements:
 1. Submit qualifications for manufacturer and installer.
 2. Submit manufacturer's approval of installer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 017000 "Execution and Closeout Requirements" for submittals requirements.
- B. Project Record Documents: Record actual locations of backflow preventer assemblies.
- C. Operation and Maintenance Data: Spare parts list, exploded assembly views, and recommended maintenance intervals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 017000 "Execution and Closeout Requirements" for maintenance materials requirements.
- B. Extra Stock Materials: Furnish two sets of seals for each backflow preventer assembly.

1.9 QUALITY ASSURANCE

- A. Perform Work according to standards set by authorities having jurisdiction.
- B. Maintain a copy of each standard affecting Work of this Section on Site.

1.10 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 “Product Requirements” for transporting, handling, storing, and protecting products requirements.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Furnish temporary protective coating for cast iron and steel valves.
- D. Furnish temporary end caps and closures for pipe and fittings; maintain caps and closures in place until installation.
- E. Protection:
 - 1. Provide temporary covers for backflow preventer assemblies to prevent entry of foreign materials.
 - 2. Protect openings in sections of completed piping systems.
 - 3. Protect openings in piping systems when Work is not in progress.

1.12 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.13 WARRANTY

- A. Section 017000 “Execution and Closeout Requirements” for warranties requirements.
- B. Furnish five-year manufacturer's warranty for backflow preventer assemblies.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Vortex; or equal.
 - 2. Substitutions: Section 016000 “Product Requirements.”
 - 3. Furnish materials according to standards set by authorities having jurisdiction.
- B. Reduced-Pressure Backflow Preventers:
 - 1. Size: 3/4 inch to 2 inches.
 - 2. Comply with ASSE 1013 and AWWA C511.

3. Materials:
 - a. Body: Bronze.
 - b. Internal Parts: Bronze.
 - c. Springs: Stainless steel.
4. Check Valves:
 - a. Quantity: Two, operating independently.
 - b. Spring loaded.
 - c. Third Check Valve: Open under back pressure in case of diaphragm failure.
5. Differential Pressure Relief Valve:
 - a. Type: Diaphragm.
 - b. Located between check valves.
6. Ball Valves:
 - a. Type: OS&Y gate or full bore ball, resilient seated.
 - b. Quantity: Two.
 - c. Operation: Quarter turn(Ball Valve).
 - d. Material: Bronze.
7. Accessories: Strainer and test cocks.
8. Valves shall be of similar material as that of the backflow device body, including epoxy coating. Unit shall have replaceable bronze seats and captured springs.
9. Each unit shall be provided with a complete set of spare parts which shall be stored adjacent to the unit in a wood crate labeled with list of contents.

C. Double Check Valve Backflow Preventer Assemblies:

1. Size: 1/2 inch to 3 inches.
2. Comply with ASSE 1015 and AWWA C510.
3. Materials:
 - a. Body: Bronze.
 - b. Internal Parts: Corrosion resistant.
 - c. Springs: Stainless steel.
4. Check Valves:
 - a. Quantity: Two, operating independently.
 - b. Intermediate atmospheric vent.
5. Ball Valves (inlet and outlet):
 - a. Type: Full port, resilient seated, UL/FM approved for fire service line.
 - b. Quantity: Two.

- c. Operation: Quarter turn.
 - d. Material: Bronze.
- 6. Accessories: Strainer and 4 test cocks.
- 7. Provide complete set of spare parts stored adjacent to unit in a wood crate labeled with contents.

2.2 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon Tape:

- 1. Brightly colored, continuously printed.
- 2. Size: Minimum 6 inches wide by 4 mil thick.
- 3. Manufactured for direct burial service.

B. Trace Wire:

- 1. Description: Electronic detection materials for non-conductive piping products.
- 2. Copper Wire: Unshielded 10 gage THWN, insulated.
- 3. Conductive tape.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 "Execution" for installation examination requirements.
- B. Verify that excavations are to required grade, dry, and not over-excavated.
- C. Verify that piping connections to existing piping system, sizes, locations, and inverts are as indicated on Drawings.

3.2 PREPARATION

- A. Section 017300 "Execution" for installation preparation requirements.
- B. Remove scale and dirt on inside and outside before assembly.

3.3 INSTALLATION

A. Backflow Preventer Assemblies:

- 1. Install backflow preventers of type, size, and capacity indicated.
- 2. Comply with applicable code and authority having jurisdiction.
- 3. Install air-gap fitting on units with atmospheric vent connection.

4. Pipe relief outlet drain to nearest floor drain.
5. Do not install bypasses around backflow preventers.

3.4 FIELD QUALITY CONTROL

- A. See Section 014000 “Quality Requirements” for inspecting and testing requirements.
- B. Perform pressure test on backflow pressure assembly installation as specified in Section 331116 “Site Water Utility Distribution Piping.”

3.5 CLEANING

- A. Sections 017300 “Execution” and 017700 “Closeout Procedures” for cleaning requirements.
- B. Disinfect backflow preventer assembly installation as specified in Section 331300 “Disinfecting of Water Utility Distribution.”

END OF SECTION 331200

SECTION 331213 - WATER SERVICE CONNECTIONS

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. Pipe and fittings for 2- inch (or as specified on Drawings) water service connections.
2. Underground pipe markers.
3. Bedding and cover materials.

- B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete for thrust restraints.
2. Section 310515 "Soils and Aggregates for Earthwork" for backfill soil type.
3. Section 312000 "Earthwork" for excavation of pipe trench.
4. Section 331300 "Disinfecting of Water Utility Distribution" for flushing and disinfecting of water system.

1.3 ACTION SUBMITTALS

- A. Section 013300 "Submittal Procedures" for requirements for submittals.
- B. Product Data: Submit data on pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.
- C. Shop Drawings: Indicate details showing vault and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- B. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- D. Qualifications Statement:

1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Section 017700 "Closeout Procedures" for requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work according to City of Watertown standards.
- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store products and materials off ground and under protective coverings and away from walls.
- C. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

PART 2 - PRODUCTS

2.1 WATER PIPING AND FITTINGS

- A. Copper Tubing:
 1. Comply with ASTM B88.
 2. Type K, annealed.
 3. Fittings: Conform to ASME B16.18, cast copper.
 4. Joints: Compression connection.

2.2 UNDERGROUND PIPE MARKERS

- A. Manufacturers:
 - 1. Furnish materials according to City of Watertown standards.
- B. Plastic Ribbon Tape:
 - 1. Brightly colored, continuously printed.
 - 2. Size: Minimum 6 inches wide by 4 mil thick.
 - 3. Manufactured for direct burial service.
- C. Trace Wire:
 - 1. Description: Electronic detection materials for non-conductive piping products.
 - 2. Copper Wire: Unshielded 10 gage THWN, insulated.
 - 3. Conductive tape.

2.3 MATERIALS

- A. Bedding and Cover:
- B. Bedding: Fill Type, as specified in Section 310515 "Soils and Aggregates for Earthwork."
- C. Cover: Fill Type, as specified in Section 310515 "Soils and Aggregates for Earthwork."
- D. Soil Backfill from Above Pipe to Finish Grade:
 - 1. Soil Type, as specified in Section 310515 "Soils and Aggregates for Earthwork"

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 "Execution" for requirements for installation examination.
- B. Verify that building service connections and municipal utility water main sizes, locations, and inverts are as indicated on Drawings.

3.2 PREPARATION

- A. Section 017300 "Execution" for requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
- C. Remove scale and dirt from inside and outside of piping before assembly.

- D. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312000 "Earthwork."
2. Placement:
 - a. Place bedding material at trench bottom.
 - b. Level fill materials in one continuous layer not exceeding 6 inches compacted depth.
 - c. Compact to 95 percent maximum density.
3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 95 percent maximum density.

B. Pipe and Fittings:

1. Maintain separation of water main from sewer piping according to City of Watertown code.
2. Group piping with other Site piping Work whenever practical.
3. Install pipe to indicated elevation to within tolerance of 5/8 inch.

C. Disinfection of Water Piping System:

1. Flush and disinfect system as specified in Section 331300 "Disinfecting of Water Utility Distribution."

3.4 FIELD QUALITY CONTROL

A. Pressure test system according to AWWA C600 and following:

1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
2. Conduct hydrostatic test for at least two hours.
3. Slowly fill with water section to be tested and expel air from piping at high points.
4. Install corporation cocks at high points.
5. Close air vents and corporation cocks after air is expelled.
6. Raise pressure to specified test pressure.
7. Observe joints, fittings, and valves under test.
8. Remove and replace cracked pipes, joints, fittings, and valves that show visible leakage and retest.
9. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate, maintaining test pressure within plus or minus 5.0 psi.
10. Leakage is defined as quantity of water supplied to piping as necessary to maintain test pressure during testing period.
11. Compute maximum allowable leakage using following formula:

$L = [SD \times \sqrt{P}]/C$
L = testing allowance, gph
S = length of pipe tested, feet
D = nominal diameter of pipe, inches
P = average test pressure during hydrostatic test, psig
C = 148,000
If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

12. If test of pipe indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
 13. Correct visible leaks regardless of quantity of leakage.
- B. Compaction Testing for Bedding: Comply with ASTM D1557.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331213

SECTION 331300 - DISINFECTING OF WATER UTILITY DISTRIBUTION

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. Disinfection of potable water distribution system.
 - 2. Testing and reporting of results.

1.3 ACTION SUBMITTALS

- A. See Section 013300 "Submittal Procedures" for detailed submittal.
- B. Product Data: Procedures, proposed chemicals, and treatment levels.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate: Products meet or exceed specified requirements.
- B. Certify cleanliness of water distribution system meets or exceeds specified requirements.
- C. Certify water conforms or fails to conform to bacterial standards of authority having jurisdiction.
- D. Certify water conforms to quality standards of authority having jurisdiction.
- E. Test and Evaluation Reports: Testing results comparative to specified requirements.
- F. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.
- G. Disinfection and Chlorination Water Disposal Plan: To be submitted by Contractor for review and acceptance by Owner and Engineer.
- H. Qualifications Statements: Qualifications for water treatment firm and testing firm. Include operator's license to perform the disinfection Work as required by Authorities Having Jurisdiction.

1.5 CLOSEOUT SUBMITTALS

- A. See Section 017000 “Execution and Closeout Requirements” for detailed submittal requirements.
- B. Disinfection Report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Special disinfecting procedures used for connections to existing pipes.
 - 5. Name of person collecting samples.
 - 6. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 7. Date and time of flushing start and completion.
 - 8. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Submit bacteriologist's signature and authority associated with testing.

1.6 QUALITY ASSURANCE

- A. Perform Work according to AWWA C651; continuous feed and City of Watertown standards.
- B. Maintain a copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years' documented experience.
- B. Testing Firm: Company specializing in testing potable water systems, approved by Commonwealth of Massachusetts

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

- A. Chemicals: Hypochlorite: Comply with AWWA B300.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. See Section 017000 “Execution and Closeout Requirements” for installation examination requirements.
- B. Verify that piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

- A. Provide and attach required equipment to perform Work of this Section. Closely coordinate efforts with Owner for maintenance of site operations and for testing services.
- B. Perform disinfection of water distribution system and installation of system and pressure testing as specified in Section 331116 “Site Water Utility Distribution Piping.”
- C. Introduce treatment into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved using municipal domestic water.
- F. Replace permanent system devices that were removed for disinfection.

3.3 FIELD QUALITY CONTROL

- A. Disinfection, Flushing, and Sampling:
 - 1. Disinfect pipeline installation.
 - 2. Use of liquid chlorine is permitted.
 - 3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
 - 4. Disposal:
 - a. Legally dispose of chlorinated water.
 - b. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
 - 5. After final flushing and before pipeline is connected to existing system or placed in service, employ an approved independent testing laboratory to sample, test, and certify that water quality meets quality standards of authority having jurisdiction.

END OF SECTION 331300

SECTION 333113 - PUBLIC SANITARY UTILITY SEWERAGE PIPING

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. Sanitary sewerage gravity pipe and fittings.
 - 2. Pipe markers.
 - 3. Connection to manholes.
 - 4. Bedding and cover materials.

- B. Related Requirements:

- 1. Section 310515 "Soils and Aggregates for Earthwork" for soils and aggregate for backfill in trenches.
 - 2. Section 312000 "Earthwork" for product and execution requirements for excavation and backfill required by this Section.
 - 3. Section 330513 "Manholes and Structures."

1.3 COORDINATION

- A. Section 013100 "Project Management and Coordination" for coordination requirements.
- B. Coordinate Work of this Section with municipal department having jurisdiction.
- C. Notify affected utility companies at least 72 hours prior to construction.

1.4 PREINSTALLATION MEETINGS

- A. Section 013100 "Project Management and Coordination" for preinstallation meeting requirements.
- B. Convene minimum one week prior to commencing Work of this Section. At the pre-installation meeting, discuss at a minimum, construction schedule, coordination with others, known deviations from the specifications, communication protocols and quality control / testing procedures and system start-up procedures.

1.5 ACTION SUBMITTALS

- A. Section 013300 “Submittal Procedures” for submittals requirements.
- B. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials to be used, accessories, details, and construction information.
- C. Shop Drawings:
 - 1. Drawings showing layout and details of pipe, reinforcement, joints, gaskets, special fittings and the name of the pipe manufacturer.

1.6 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate: Products meet or exceed specified requirements.
- B. Test and Evaluation Reports: Documenting field tests made and results obtained.
- C. Manufacturer Instructions: Procedures required to install specified products.
- D. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.
- E. Qualifications Statements:
 - 1. Qualifications for manufacturer and installer.
 - 2. Manufacturer's approval of installer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 017700 “Closeout Procedures” for submittals requirements.
- B. Project Record Documents: Record invert elevations and actual locations of pipe runs, connections, and manholes.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

- A. Perform Work according to Massachusetts Department of Transportation and City of Watertown standards.
- B. Maintain a copy of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 "Product Requirements" for transporting, handling, storing, and protecting products requirements. Refer to specific pipe material specifications for additional information.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage: Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Provide additional protection according to manufacturer instructions.
 - 4. Protect materials from weather and UV exposure.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Field verify fit-up to existing infrastructure prior to fabrication.
 - 3. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPE AND FITTINGS

- A. Plastic Pipe: Polyvinyl chloride (PVC) per ASTM D3034, SDR-35.
 - 1. Inside Nominal Diameter: as indicated on Drawings.
 - 2. End Connections: Bell and spigot style, with rubber-ring-sealed gasket joint.
 - 3. Fittings: PVC.
 - 4. Joints: Elastomeric gaskets per ASTM F477.

2.2 FLEXIBLE COUPLINGS

- A. Manufacturers:
 - 1. Substitutions: See Paragraph 7.05 of the General Conditions.
 - 2. Furnish materials according to standards set by authorities having jurisdiction.

B. Description: Resilient chemical-resistant elastomeric polyvinyl chloride (PVC) coupling.

1. Attachment: Two Series 300 stainless-steel clamps, screws, and housings.

2.3 FLEXIBLE PIPE BOOT FOR MANHOLE PIPE ENTRANCES

A. Manufacturers:

1. Substitutions: See Paragraph 7.05 of the General Conditions.
2. Furnish materials according to standards set by authorities having jurisdiction.

B. Description: Ethylene propylene rubber (EPDM) per ASTM C923.

1. Attachment: Series 300 stainless-steel clamp and hardware.

2.4 IRON BODY SWING CHECK VALVES 4-INCH AND LARGER – Tag Type SCV1

A. Manufacturers: Kennedy Valve, GA Industries, Valve and Gate Group, Pratt, Mueller Co., Val-Matic or approved equal.

B. Description:

1. Comply with AWWA C508.
2. Size: 4 inches and larger.
3. Type: Swing, metal disc, with hinge shaft extended from body, sealed with stuffing box, packing and gland.
4. Seat: Resilient.
5. Working Pressure: 175 psig
6. Disc Controller: Spring
7. Mounting: Horizontal or vertical.
8. End Connections: Flanged, ASME B16.42.

C. Materials:

1. Body and Cover: Ductile iron, ASTM A536
2. Disc: Bronze, ASTM B62
3. Seat: Field replaceable, bronze, ASTM B62.
4. Cover hardware: Type 316 stainless steel
5. Chamber and Plunger: Bronze, ASTM B62
6. Hinge Shaft and Key: A582 Type 416 Stainless Steel
7. Hinge Shaft Gland: A582 Type 416 Stainless Steel
8. Packing and O-Ring: Buna N
9. Grease Fittings: Type 316 stainless steel.
10. Rubber Components: Buna-N
11. Connecting Hardware: Type 304 stainless steel.

2.5 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill as specified in Section 310515 “Soils and Aggregates for Earthwork.”
2. Cover: Fill as specified in Section 310515 “Soils and Aggregates for Earthwork.”
3. Soil Backfill from Above Pipe to Finish Grade:
 - a. Soil Type as specified in Section 310515 “Soils and Aggregates for Earthwork.”
 - b. Subsoil with no rocks over 6 inches in diameter, frozen earth, or foreign matter.

2.6 FINISHES

- ### A. Galvanizing: Hot-dip galvanize after fabrication per ASTM A123.

2.7 ACCESSORIES

A. Underground Pipe Markers

1. Manufacturers
 - a. Mutual Industries, Inc.
 - b. Bernsten International, Inc.
 - c. Terra Tape, Div. of Reef Industries, Inc.
 - d. Substitutions: See Paragraph 7.05 of the General Conditions.
2. Ribbon Tape
 - a. Material: Polyethylene silver metal detectable tape
 - b. Brightly colored, green, continuously printed with the warning message for the utility such as “CAUTION – SEWER LINE BURIED BELOW”.
 - c. Size: Minimum 6 inches wide by 5 mil thick.
 - d. Meet American Public Works Associations (APWA) requirements
 - e. Manufactured for direct burial service

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 “Execution” for installation examination requirements.
- B. Verify that trench cut and excavation base is ready to receive Work.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 017300 “Execution” for installation preparation requirements.
- B. Correct over-excavation with coarse aggregate.
- C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- D. Protect and support existing sewer lines, utilities, and appurtenances.
- E. Utilities:
 - 1. Maintain profiles of utilities.
 - 2. Coordinate with other utilities to eliminate interference.
 - 3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench as specified in Section 312000 “Earthwork”
 - 2. Excavate to lines and grades as indicated on Drawings, or as required to accommodate installation of encasement.
 - 3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
 - 4. Provide sheeting and shoring as specified in Section 312000 “Earthwork”
- B. Piping:
 - 1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
 - 2. Lay pipe to slope gradients as indicated on Drawings.
 - 3. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.
 - 4. Begin at downstream end and progress upstream.
 - 5. Assemble and handle pipe according to manufacturer’s instructions, except as may be modified on Drawings or by Engineer.
 - 6. Keep pipe and fittings clean until Work has been completed and accepted by Engineer.
 - 7. Cap open ends during periods of Work stoppage.
 - 8. Lay bell and spigot pipe with bells upstream.
 - 9. Backfill and compact as specified in Section 312000 “Earthwork.”
 - 10. Do not displace or damage pipe when compacting.
 - 11. Connect pipe to existing sewer system at existing manhole.
- C. Connection to Existing Manholes:
 - 1. Drilling: Core drill existing manhole to clean opening.
 - a. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.
 - 2. Install watertight neoprene gasket and seal with non-shrink concrete grout.

3. Prevent construction debris from entering existing sewer line when making connection.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 “Quality Requirements” for inspecting and testing requirements.
- B. Request inspection by Engineer prior to and immediately after placing bedding.
- C. Testing: If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
- D. Testing of Gravity Sewer Piping:
 1. Low Pressure Air Testing:
 - a. Test each reach of gravity sewer piping between manholes.
 - b. Introduce air pressure slowly to approximately 4 psig.
 - 1) Determine ground water elevation above spring line of piping.
 - 2) For every foot of ground water above spring line of piping, increase starting air test pressure by 0.43 psi.
 - 3) Do not increase pressure above 10 psig.
 - c. Allow pressure to stabilize for at least five minutes.
 - d. Adjust pressure to 3.5 psig or to increased test pressure as determined above when ground water is present.
 - e. Testing: Determine test duration for reach of sewer with single pipe size from following table; do not make allowance for laterals.

NOMINAL PIPE SIZE, INCHES	MINIMUM TESTING TIME, MINUTES/ 100 FEET
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

- 1) Record drop in pressure during testing period.

- 2) Test Acceptance: If 1.0 psi air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.
 - 3) Test Failure: If air pressure drops more than 1.0 psi during testing period, piping has failed.
 - a) If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.
2. Maximum Allowable Infiltration: 100 gal/in of pipe diameter for each mile per day for reach of piping undergoing testing.
 - a. Include allowances for leakage from manholes.
 - b. Perform testing with minimum positive head of 2 feet.
3. Deflection Testing of Plastic Sewer Piping:
 - a. Vertical Ring Deflection Testing: On PVC and acrylonitrile butadiene styrene sewer piping after backfilling has been in place for 30 days but not longer than 12 months.
 - b. Allowable Maximum Deflection: For installed plastic sewer pipe; not greater than 5 percent of original vertical internal diameter.
 - c. Deflection Testing: Using properly sized rigid ball or "go, no go" mandrel.
 - 1) Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe, as determined by ASTM standard to which pipe is manufactured.
 - 2) Measure pipe diameter in compliance with ASTM D2122.
 - d. Perform testing without mechanical pulling devices.
 - e. Locate, excavate, replace, and retest piping that exceeds allowable deflection.
4. Compaction Testing:
 - a. Comply with ASTM D1557.

3.5 PROTECTION

- A. Section 017300 "Execution" for protecting finished Work requirements.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 333113

SECTION 334113 - PUBLIC STORM UTILITY DRAINAGE PIPING

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. Storm drainage piping.
2. Piping accessories.
3. Bedding and cover materials.

- B. Related Requirements:

1. Section 310515 "Soils and Aggregates for Earthwork" for soils and aggregate for backfill in trenches.
2. Section 312000 "Earthwork" for product and execution requirements for excavation and backfill required by this Section.
3. Section 330513 "Manholes and Structures" for concrete manholes, frames and grates for storm drainage.

1.3 COORDINATION

- A. Section 013100 "Project Management and Coordination" for requirements for coordination.
- B. Coordinate Work of this Section with termination of storm sewer, trenching, connection to public storm drainage system.

1.4 PREINSTALLATION MEETINGS

- A. Section 013100 "Project Management and Coordination" for requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 ACTION SUBMITTALS

- A. Section 013300 "Submittal Procedures" for requirements for submittals.
- B. Product Data: Submit data indicating pipe and pipe accessories.

- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.6 CLOSEOUT SUBMITTALS

- A. Section 017700 "Closeout Procedures": Requirements for submittals.
- B. Project Record Documents: Record actual locations of pipe runs and connection to drainage manhole.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

- A. Perform Work according to Massachusetts Department of Transportation Standard Specifications for Highways and Bridges (SSHB) and City of Watertown standards.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 "Product Requirements" for requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
 - 4. Do not place pipe flat on ground; cradle to prevent point stress.

D. Protection:

1. Keep UV-sensitive materials out of direct sunlight.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Plastic Piping:

1. Pipe:
 - a. Material: PVC.
 - b. Comply with ASTM D3034, SDR 35.
 - c. Inside Nominal Diameter: As indicated on Drawings
 - d. Style: Bell and spigot with rubber-ring sealed gasket joint.
2. Fittings: PVC.
3. Joints:
 - a. Comply with ASTM F477.
 - b. Gaskets: Elastomeric.

2.2 DRAINAGE STRUCTURES

- A. Description: As specified in Section 330513 “Manholes and Structures.”

2.3 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill as specified in Section 310515 “Soils and Aggregates for Earthwork.”
2. Cover: Fill as specified in Section 310515 “Soils and Aggregates for Earthwork.”
3. Soil Backfill from above Pipe to Finish Grade: Soil Type, as specified in Section 310515 “Soils and Aggregates for Earthwork.”
4. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.4 MIXES

A. Grout: Nonshrink Cementitious Grout

1. Description
 - a. Pre-mixed and ready-for-use formulation requiring only addition of water.
 - b. Nonshrink, non-corrosive, nonmetallic, non-gas forming, not containing expansive cement and no chlorides.

- c. No shrinkage when tested in conformity with ASTM C 827.
- 2. Performance and Design Criteria:
 - a. Certified to maintain initial placement volume or expand after set, and to meet following minimum properties when tested according to ASTM C 1107 for Grades B, C, D and CRD-C621 nonshrink grout:
 - 1) Setting Time:
 - a) Initial: Approximately two hours.
 - b) Final: Approximately three hours.
 - c) Comply with ASTM C 191.
 - 2) Maximum Expansion: 0.10 to 0.40 percent.
 - 3) Minimum Compressive Strength:
 - a) One-Day: 4,000 psi.
 - b) Seven-Day: 7,000 psi.
 - c) 28-Day: 10,000 to 10,800 psi.
 - d) Comply with CRD-C621.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 "Execution" for requirements for installation examination.
- B. Verify that trench cut and excavation base is ready to receive Work.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 017300 "Execution" for requirements for installation preparation.
- B. Correct over-excavation with coarse aggregate.
- C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

- A. Excavation and Bedding:
 - 1. Excavate pipe trench as specified in Section 312000 "Earthwork."
 - 2. Hand trim excavation for accurate placement of piping to indicated elevations.

3. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
4. Provide sheeting and shoring as specified in Section 312000 "Earthwork."
5. Level materials in continuous layers not exceeding compacted depth of 12 inches.
6. Maintain optimum moisture content of bedding material to attain required compaction density.
7. Install pipe on compacted subgrade meeting bedding requirements.

B. Piping:

1. Install pipe, fittings, and accessories according to ASTM D2321.
2. Seal joints watertight.
3. Place pipe on minimum 12-inch deep bed of compacted subgrade meeting bedding requirements.
4. Verify that drainage system is as indicated on Drawings. Drawing details should describe location of coarse and fine aggregate in relation to pipe and pipe bedding, dimensions of cut trench width, and details of connections to other Work.
5. Lay pipe to slope gradients as indicated on Drawings.
6. Connect piping to drainage structures.
7. Install aggregate at sides and over top of pipe.
8. Install top cover to minimum compacted thickness of 12 inches, and compact to 95 percent maximum density.

C. Backfilling and Compaction:

1. As specified in Section 312000 "Earthwork."
2. Do not displace or damage pipe while compacting.

D. Drainage Structures:

1. Catch Basins, Inlets, Manholes: As specified in Section 330513 "Manholes and Structures."

3.4 TOLERANCES

- A. Section 014000 "Quality Requirements" for requirements for tolerances.

3.5 FIELD QUALITY CONTROL

- A. Sections 017300 "Execution" and 017700 "Closeout Procedures": Requirements for testing, adjusting, and balancing.
- B. Request inspection by Engineer prior to and immediately after placing aggregate cover over pipe.
- C. Testing:
1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

D. Compaction Tests:

1. Comply with ASTM D1557.

E. Cleaning:

1. At the conclusion of the Work, thoroughly clean all new pipe lines by flushing with water or other means to remove all dirt, stones, pieces of wood or other material that may have entered during construction.

3.6 PROTECTION

- A. Section 017700 "Closeout Procedures" for requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 334113

SECTION 400557 - ACTUATORS FOR PROCESS VALVES AND GATES

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: Following types of actuators for linear, multi-turn, and quarter turn valves and gates:
 - 1. Electric motor actuators.
- B. Related Requirements:
 - 1. Section 400564 "Butterfly Valves" for common product requirements for valves for placement by this Section.

1.3 DEFINITION

- A. Where the term "valve" alone is used in this Section, it applies to both valves and gates as the corresponding text context dictates.

1.4 COORDINATION

- A. Section 013000 "Administrative Requirements" for coordination requirements.
- B. Coordinate Work of this Section with installation of valves, gates, and accessories.

1.5 PREINSTALLATION MEETINGS

- A. Section 013000 "Administrative Requirements" for preinstallation meeting requirements.
- B. Convene minimum one week at site prior to commencing Work of this Section.

1.6 SUBMITTALS

- A. Section 013300 "Submittal Procedures" for submittals requirements.
- B. Product Data: Manufacturer information for actuator with model number and size indicated.
- C. Shop Drawings:

1. Parts list, materials, sizes, position indicators, limit switches, actuator mounting, wiring diagrams, control system schematics with external interfaces on assembly drawings.
 2. Actuator Shop Drawings with respective valve submittal.
- D. Manufacturer's Certificate: Products meet or exceed specified requirements.
- E. Manufacturer Instructions: Special procedures and placement requirements.
- F. Source Quality-Control Submittals: Results of factory tests and inspections and provide required certifications.
- G. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.
- H. Qualifications Statements:
1. Qualifications for manufacturer and installer.
 2. Manufacturer's approval of installer.
- I. American Iron and Steel (AIS): Certification of compliance with requirements

1.7 CLOSEOUT SUBMITTALS

- A. Section 017700 "Closeout Procedures" for submittals requirements.
- B. Project Record Documents: Documentation of actual locations and types of actuators.

1.8 QUALITY ASSURANCE

- A. Valve Actuators in NEC Class I, Division 1, Group D Hazardous Locations: Comply with NFPA 70.
- B. Minimum NEMA Enclosure Classification:
1. Non-submergence Installations: NEMA 4X.
 2. Submergence Installations: NEMA 6P/IP68.
- C. Perform Work according to City of Watertown standards.
- D. Maintain a copy of each standard affecting Work of this Section on Site.
- E. Single Source Requirements:
1. Furnish electric motor actuators in the scope of the project by the same manufacturer. Coordinate this requirement with actuated valves and gates included in scope of vender furnished equipment.
 2. Furnish actuators, floor stands, stem guides, stems, extensions, and accessories for slide gate assemblies by slide gate manufacturer.
- F. Mate actuators to equipment at equipment manufacturers or integrators facility.

1. Test assembled product. Certify ready for installation prior to shipment to job site.
2. For extremely large assemblies requiring disassembly for installation, the actuator may be disassembled for shipment and remounted in the field.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum five years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 "Product Requirements: for transporting, handling, storing, and protecting products requirements.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
 3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 1. Verify field measurements prior to fabrication.
 2. Indicate field measurements on Shop Drawings.

1.12 WARRANTY

- A. Section 017700 "Closeout Procedures" for warranties requirements.
- B. Manufacturer's Special Warranty: Submit standard written warranty against manufacturing defects for electric-motor actuators.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Refer to valve and gate schedule for actuator type, accessories, and sizing information.
- B. Provide clockwise closed actuation unless otherwise noted on the valve and gate schedule.
- C. Supply chain actuators for manual valves located 7 feet or higher above finished floor.

2.2 ACCESSORIES

- A. Floor Stands:
 - 1. Materials:
 - a. Stand: Cast iron.
 - b. Stem Bushing: Sintered bronze.
 - c. Position Indicator: Bronze.
 - 2. Height to input shaft or handwheel: As indicated on Drawings.
 - 3. Base Mounting Requirements:
 - a. Concrete Floor Mounting: Type 316 stainless-steel anchor bolts.
 - b. Face of Basin or Offset Mounting: Heavily reinforced, adjustable wall bracket with required anchor hardware using Type 316 stainless steel.
 - 4. Actuator Mounting Requirements:
 - a. Manual Actuator: Cast iron handwheel on top of floor stand with dual ball type thrust bearings, grease fitting on bearing bowl, hardened machined alloy bronze lift nut (for rising stem). Where manual effort is greater than 40 lb rim pull with 2 feet diameter wheel, provide geared actuator with a handwheel or crank.
 - 1) Handwheel casting to include the word "OPEN" and an arrow indicating the direction of operation.
 - b. Gearbox or Direct Powered Actuator: Through bolt holes matched to actuator or gearbox bolting pattern.
 - 5. Non-rising stem position indicator: Mechanical indicator connected to and driven by stem extension and cast position marks on floor stand with the word "OPEN" cast at the top of the travel, and a field mounted aluminum "CLOSED" tag supplied with drive rivets, installed based on number of valve turns.
 - 6. Rising Stem Position Indicator: Permanent markings on transparent stem covers.
- B. Stem Covers: Fracture-resistant clear polycarbonate stem covers for rising stems. Closed top with position indicator markings.
- C. Extension Stems and Stem Guides:

1. Extension stems and couplings to actuate recessed, buried, below slab valves and gates via operating nut or floor stand mounted actuator.
2. Stem Extensions and Stem Couplings: Alloy steel, hardware of Type 316 stainless steel unless specified otherwise in the respective slide gate specification.
3. Stem and Stem Couplings: Rated for five times the maximum input torque capacity of the actuator.
4. Adjustable, Cast Iron Wall Bracket Type Stem Guides: Include two-piece bronze bushing.
5. Spacing: 10 feet spacing or at spacing calculated by manufacturer to prevent buckling with a safety factor of 2 based on design thrust, shaft material and shaft size.

D. Torque Tubes:

1. Supply where shown on the Drawings or Valve and Gate Schedule.
2. Supported by/mated to valve bonnet/yoke.
3. Sized by supplier for the required actuator torque.
4. Drilled specifically for valve and actuator bolt pattern.
5. Internal extension keyed or shaped specifically to mate to valve shaft and fabricated of Type 316 stainless steel.
6. Internal extension designed for axial adjustment for mating purposes.

E. Chain Wheels:

1. Supply for manual valves 3 inch diameter or larger mounted 7 feet and greater above operating floor level.
2. Type: Sprocket rim with chain and floating chain guide.
3. Chain Wheel and Guides Materials: Cast iron with hot-dip galvanized chain.
4. Chain Length: Extend to 5-1/2 feet above operating floor level.
5. Chain Storage: Include where chains may interfere with personnel egress; made with high-strength thermoplastic polymer in safety orange color.
 - a. Basis-of-Design: Trumbull, Model 'Chain Up' as manufactured by Trumbull Manufacturing, Inc., or equal.
6. Chain Wall Hooks: Include where feasible to prevent chain from impeding personnel egress.

2.3 ELECTRIC MOTOR ACTUATORS

A. General:

1. Where specified on the Valve and Gate Schedule.
2. Comply with AWWA C542.
3. Actuators for Valves Larger than 3 inches and for slide gates and weir gates: 480 Volt, 3 Phase, 60 Hz power supply.

B. 120 Volt Power Actuators:

1. Actuators to have reversing motor, reduction gearing, local position indicator, position limit switches, provision for manual override, 100 to 1000 in-lbs torque range and motor thermal and electronic control protection.

2. Enclosure:
 - a. Cast aluminum or steel alloy.
 - b. Powder coated or fusion bonded epoxy finish.
 - c. NEMA7 for Class 1, Division 1, Group D.
3. Power Train:
 - a. Self-locking planetary epicyclic gear design.
 - b. Hardened steel or Hardened bronze alloy gears with bronze bearings.
 - c. Housing Penetrations: Seal with mechanical seals.
 - d. Housing: Equip with space heaters.
 - e. Mounting System: ISO 5211.
4. Actuator for Open/Close/Jog Reversing Service: Proportional/modulating service where required in the equipment specifications or Instrumentation Drawings.
5. Motors:
 - a. Design for valve actuation service.
 - b. Insulation: Class F.
 - c. Split phase capacitor protection.
 - d. Duty Cycle: 40 percent at 100 degrees F for open/close duty, and 100 percent for modulating duty.
 - e. 90-Degree Travel Time: 10 to 20 seconds depending on actuator size.
 - f. Actuator Switches: Have two SPDT 15 Amp rated switches for remote open/close valve position indication.
6. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. Series 92 as manufactured by Asahi/America.
 - b. P Series as manufactured by Promotion Engineering, Inc.

2.4 SOURCE QUALITY CONTROL

- A. Section 014000 "Quality Requirements" for testing, inspection, and analysis requirements.
- B. Factory Testing:
 1. Shop inspect and test completed assemblies.
 2. Factory performance test each actuator and supply individual test certificates. Submit test certificates prior to shipment of valve actuators. Test equipment to simulate a typical valve and gate load, and record the following parameters:
 - a. No load current.
 - b. Current at maximum torque setting.
 - c. Stall current.
 - d. Torque at maximum torque setting.
 - e. Stall torque.
 - f. Test voltage and frequency.
 - g. Flash test voltage.
 - h. Actuator output speed.

C. Owner Inspection:

1. Make completed valve and gate and actuator assembly available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 "Execution," for installation examination requirements.
- B. Verify field dimensions are as indicated on Shop Drawings.

3.2 INSTALLATION

- A. Install products plumb, square, and true according to manufacturer's published installation instructions.
- B. Securely mount actuators using brackets or hardware specifically designed for attachment to valves/gates.
- C. Extend chain actuators to 5-1/2 feet above floor level.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 "Quality Requirements" for inspecting and testing requirements.

3.4 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Perform adjustments during normal occupancy hours.

3.5 DEMONSTRATIONS

- A. Refer to Section 017900 "Demonstration and Training."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain actuators.
 - 1. Time Duration: Allow four hours during a single day.

END OF SECTION 400557

SECTION 400564 - BUTTERFLY VALVES

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. AWWA butterfly valves.
 - 2. Cartridge seat, general service butterfly valves
 - 3. Double offset high performance butterfly valves
 - 4. Thermoplastic butterfly valves.
- B. Related Requirements:
 - 1. Section 400557 – Actuators for Process Valves and Gates: Actuators used or valves.
- C. Van Stone flanges shall not be used with pinch valves, industrial butterfly valves; elastomer bellows style expansion joints or other piping system components having an elastomer liner (rubber seat) that is used as a gasket.

1.3 SUBMITTALS

- A. As specified in Section 400551 - Common Requirements for Process Valves: Submittal requirements for compliance with this Section.

1.4 QUALITY ASSURANCE

- A. Test valves in accordance with AWWA C504, API 598, MSS SP61 as applicable for types listed herein.
- B. Provide Installation Inspection and Operator Training per Section 400551.
- C. Provide testing and inspection certificates.

PART 2 - PRODUCTS

2.1 AWWA BUTTERFLY VALVES- Tag Type BFV1

- A. Manufacturers:

1. DeZurik, Val-Matic, M&H, Kennedy, Pratt.
2. Substitutions: As specified in Section 016000 - Product Requirements.

B. Description:

1. Comply with AWWA C504, Class 150B. Flanged end connections per ASME B16.1.
2. Working Pressure: Per valve schedule.
3. Maximum Process Fluid Temperature: Per valve schedule.
4. Body Style: Short Body Flanged.
5. Shaft: One or two piece, mechanically secured to disc, capable for mechanical separation from disc without damage to shaft or disc.
6. Bearings: Self-lubricating.
7. Shaft Seals/Packing:
 - a. Self compensating V-type- primary means
 - b. Multiple O-rings for up to 24-inch
 - c. Pull down seals using a square braid of graphite fiber for over 24-inch
 - d. Retained by bolted retainer plate or gland, clips not acceptable
 - e. Retained by stuffing box with follower gland for over 24-inch
 - f. Replacement without removal of valve from line.
 - g. Adjustment without disturbing actuator assembly for over 24-inch
8. Seats:
 - a. Mounting: On disc.
 - b. For body mounted seats, supply machined metal seating edges on disc. Seats mechanically retained and adjustable with common tools for valves larger than 24-inch.
 - c. For disc mounted seats, fasten with a segmented or one piece machined metal retaining ring, and self-locking bolts or set screws, fully adjustable with common tools. Machined metal seat ring installed in the valve body
 - d. Type: Resilient and replaceable. Field adjustable and replaceable.

C. Actuator:

1. Electrically actuated.
2. Gear Actuators for Manual Valves: Comply with AWWA C504.

D. Materials:

1. Body: Ductile iron, ASTM A536 .
2. Stem: ASTM A276 Type 316 SS.
3. Disc: Ductile iron, ASTM A536.
4. Seats:
 - a. Elastomer: Buna-N.
 - b. Retaining Ring: ASTM A276 Type 316 SS.
 - c. Seat Ring: ASTM A276 Type 316 SS.
5. Bearings:

- a. Sleeve: Nylatron.
 - b. Thrust: Bronze ASTM 763, Alloy C99500.
- 6. Connecting Hardware: ASTM A276 Type 316 SS.
- E. Finishes:
 - 1. Manufacturers standard fusion bonded epoxy

2.2 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.
- B. As specified in Section 400551 - Common Requirements for Process Valves.
- C. Testing: Test butterfly valves according to AWWA C504.
- D. Submit an affidavit of compliance stating that the valves have been manufactured and tested in accordance with AWWA C504 and specifically list all exceptions.

PART 3 - EXECUTION

3.1 Examination

- A. As specified in Section 400551 - Common Requirements for Process Valves: Submittal requirements for compliance with this Section.

3.2 INSTALLATION

- A. According to Manufacturer's Instructions.
- B. Inspect valve interiors before line closure for the presence of debris. At the option of the Engineer, internal inspection of valve and appurtenances may be required any time that the likelihood of debris is a possibility. Clean connection pipes prior to installation, testing and final acceptance.
- C. Rigidly support valves to avoid stresses on piping.
- D. Coat studs, bolts and nuts with ant-seizing lubricant.
- E. Dielectric Fittings: Provide between dissimilar metals.
- F. Clean field welds of slag and splatter to provide smooth surface.
- G. Mate, adjust and fully test electric actuators to valves at manufacturer's or integrator's facility.
 - 1. Only in special cases for extremely large assemblies where installation requires disassembly may actuators be mounted to the valves in the field. These circumstances require preinstallation meetings.

- H. In no case shall stems be installed vertically downward.
- I. Unless otherwise indicated on the Drawings:
 - 1. Install Butterfly valves 12 inch and smaller with stem horizontal or vertical in the 12 o'clock position.
- J. Install all brackets, extension rods, guides, the various types of operators and appurtenances as indicated. Before properly setting these items, check all drawings and figures which have a direct bearing on their location.
- K. Inspect all materials for defects in construction and materials. Clean debris and foreign material out of openings, etc. Valve flange covers shall remain in place until connected piping is in place. Verify operability of all operating mechanisms for proper functioning. Check all nuts and bolts for tightness. Repair or replace valves and other equipment which do not operate easily or are otherwise defective.
- L. Where installation is covered by a referenced standard, installation shall be in accordance with that standard, except as herein modified, and the Contractor shall certify such. Also note additional requirements in other parts of this Section.
- M. Unless otherwise noted, joints for valves and appurtenances shall be made up utilizing the same procedures as specified under the applicable type connecting pipe joint. Install valves and other items as recommended by the manufacturer. Verify manufacturers' torquing requirements for all valves.
- N. Coordinate direction of flow through offset type and shaped butterfly valve discs with the mated actuator torque capacity.
- O. Vertically center floor boxes, valve boxes, extension stems, and low floor stands over the operating nut, with couplings as required.
 - 1. Adjust elevation of the box top to conform to the elevation of the finished floor surface or grade at the completion of the Contract.
 - 2. Support boxes and stem guides during concrete placement to maintain vertical alignment.
- P. Install brass male adapters on each side of valves in copper-piped system and solder adapters to pipe.
- Q. Provide access where valves and fittings are not accessible
- R. Van Stone flanges shall not be used with industrial butterfly valves, or other piping system components having an elastomer liner that is used as a gasket.

END OF SECTION 400564



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Bethany A. Card
Secretary

Martin Suuberg
Commissioner

September 22, 2022

Gregory M. St. Louis
Superintendent of Public Works
Department of Public Works
Town of Watertown
149 Main Street
Watertown, MA 02472

RE: WATERTOWN—Solid Waste Management
Watertown Landfill/Filippello Park
166 Grove Street
FMF#: 39850

BWP SW45 / Any Facility-Alternative Review
Application Number: 22-SW45-0016-APP
Authorization Number: SW45-0000164

**Filippello Park: Spray Pad Upgrade Project
Conditional Approval**

Dear Mr. St. Louis:

The Massachusetts Department of Environmental Protection, Northeast Regional Office, Bureau of Air and Waste, Solid Waste Management Section (MassDEP) has received your application, category BWP SW45, *Any Facility-Alternative Review*, Application Number: 22-SW45-0016-APP (the Application), to construct certain spray pad improvements at the City of Watertown's Filippello Park. Filippello Park is located on the closed Watertown Grove Street Landfill (the Landfill) located at 166 Grove Street in Watertown, Massachusetts. The Application was prepared and submitted to MassDEP on behalf of the City of Watertown (the City) by CDM Smith, Inc. of Boston, Massachusetts.

DISCUSSION

The Landfill is owned by the City and began accepting waste circa 1961 and continued until 1975. The Landfill was graded and covered with a minimum 30-inch thick soil layer cap. In the early 1980's, Filippello Park was established, and the City constructed playing fields and a paved court surface over portions of the Landfill. The Watertown municipal solid waste incinerator was formerly located along the eastern side of the site, near the park entrance at Grove Street. The incinerator operated from circa 1961 to 1975 and was demolished in 2004.

This information is available in alternate format. Contact Glynis Bugg at 617-348-4040.

TTY# MassRelay Service 1-800-439-2370

MassDEP Website: www.mass.gov/dep

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Park Improvement Project

On May 23, 2018, MassDEP issued a Conditional Approval of the Filippello Park Improvement Project (Transmittal Number: X277774). Park improvements included relocation of the park access road, resurfacing the court areas at the center of the site, construction of two fenced dog park areas along the southern side of the site, and installation of ten solar-powered light features. The former incinerator site was graded and a six-inch topsoil layer was installed and seeded. Associated walking paths, landscaping, benches and gazebo structures were also installed throughout the site. All excess construction soils generated by the project were placed in the "Soil Handling Berm" constructed on the former incinerator site.

Sports Field Lighting Upgrade Project

On March 5, 2019, MassDEP issued a Conditional Approval of the Filippello Park Sports Field Lighting Upgrade Project (Authorization Number: SW36 0000012). The lighting project included the replacement of existing sports lighting with a new lighting system consisting of eleven new light poles. The existing light pole concrete foundations at the park were cut down to 12 inches below grade.

In June 2018, eleven exploratory test borings were completed at the Landfill to obtain subsurface geotechnical information to support the foundation design of the proposed light poles.¹ Seven of the new light poles are located within the landfill limits and four light poles are located outside the limits of the landfill. All excess construction soils generated by the project (estimated to be approximately 300 cubic yards) were placed in the excavate storage area located at the western end of the site. Excavated soils were covered with 30 inches of clean fill and a six-inch layer of topsoil and seeded. No construction soils associated with the project were removed from the site.

Current Application (Spray Pad Upgrade Project)

As discussed in the Application, the Spray Pad Upgrade Project proposes replacement of the existing concrete spray pad, spray pad equipment and controls, installation of a new sewer/drain diverter manhole and repair and replacement of asphalt pathways disturbed during construction. The existing concrete spray pad and spray equipment will be demolished and disposed of offsite. The existing granular subbase will be supplemented and compacted, and the new concrete spray pad and pathways will be constructed.

All excess construction soils generated by the project (estimated to be approximately 50 cubic yards) will be placed in the existing excavate storage area located at the western end of the site as shown on the site plans included with the Application. The excavated soils will be covered with 30 inches of clean fill and a six-inch layer of topsoil and seeded. No construction soils associated with the project will be removed from the site.

¹ On May 17, 2018, MassDEP issued a Conditional Approval of the Exploratory Boring Program (Transmittal Number: X280447).

DECISION

MassDEP has reviewed the Application pursuant to 310 CMR 19.000, the Solid Waste Management Regulations and approves the Application subject to the Permittee's compliance with the conditions of this decision imposed by MassDEP pursuant to 310 CMR 19.043(1), *Items Subject to Conditions*.

This decision is issued by MassDEP pursuant to M.G.L. Chapter 111, § 150A and the implementing regulations thereunder at 310 CMR 19.000, the Solid Waste Management Regulations. In the event this approval conflicts with all or parts of other prior permits or approvals issued pursuant to Chapter 111, § 150A, the terms and conditions of this approval shall supersede the conflicting provisions of the prior permits or approvals. This approval does not convey property rights of any sort or any exclusive privilege. This decision does not relieve the Permittee, or any other person, of the responsibility to comply with all other applicable federal, state, and local statutes, regulations, and requirements.

CONDITIONS

1. The City shall comply with this permit and the requirements of 310 CMR 19.000, including, but not limited to, the requirements established at 310 CMR 19.043(5) *Standard Conditions*.
2. The City shall comply with 310 CMR 40.0000, the Massachusetts Contingency Plan, including, but not limited to, section 310 CMR 40.0114: Solid Waste Management Facilities.
3. The City shall ensure persons conducting activities at the Landfill are familiar with the applicable provisions of this permit and the approved plans, and that all work performed at the Landfill complies with 310 CMR 19.000 and the applicable requirements of this permit. The City shall maintain and make available at the Landfill a copy of this decision and all approved plans, appendices, protocols, and attachments for use by its contractors and employees.
4. All work under this decision shall be completed and conducted under the supervision of an independent Massachusetts Registered Professional Engineer (Engineer of Record) who shall have sufficient qualified staff on-site to provide field supervision and quality assurance/quality control for all construction activities.
5. **Required Submittals:**
 - a. Notification of Construction Schedule: Not less than seven (7) days prior to commencing work pursuant to the Application and this decision, the City shall notify MassDEP and the Watertown Board of Health (the Board of Health) in writing of the scheduled date of the commencement of work at the Landfill. In addition, the City shall provide to MassDEP and the Board of Health the following:
 - i. The projected schedule for completion of the major construction milestones;
 - ii. The name and contact information of the Engineer of Record for the project;
 - iii. The name and contact information of an on-site contact for the project; and
 - iv. A Health and Safety Plan for the project. (Also refer to Condition 6, below.)
 - b. Construction Certification Report: On or before sixty (60) days after the date of completion of the project, the City shall submit to MassDEP a construction certification report. The certification report shall include, but is not limited to:

- i. A site-plan showing the constructed park improvements, prepared by a Massachusetts Registered Professional Engineer;
 - ii. A report, prepared by the Engineer of Record, that provides, in part, the results of the construction, and discusses any modifications made to the approved project; and
 - iii. Certifications by the City and the Engineer of Record pursuant to 310 CMR 19.011.
6. The City shall ensure that all necessary actions are taken to protect the health and safety of workers and the general public during the construction of the proposed park improvements. The ambient air above excavations shall be monitored for volatile organic compounds (VOCs) and methane, and the observations of said monitoring shall be documented. A Health and Safety Plan for the project shall be developed and submitted to MassDEP, for the facility file that includes, but is not limited to, protocols for monitoring of landfill gas (methane, hydrogen sulfide, etc.).
7. The City shall limit all disturbance of the Landfill to the proposed improvements as depicted and described in the Application, Application Number: 22-SW45-0016-APP, and this decision. Any additional activities or modifications not described in the Application may require notification of MassDEP, and the preparation and submittal of a separate application for permit modification.
8. The City and any other contractors performing work at the Landfill shall without delay notify the Engineer of Record or his/her on-site representative upon encountering or disturbing waste below the soil layer of the landfill cap. In the event that waste is encountered, the City shall notify MassDEP without delay and in no case later than the close of business of the next business day. This notification requirement is in addition to any other notifications required by statute or regulation including, but not limited to, 310 CMR 19.000 and 310 CMR 40.0000.
9. All waste materials not returned to the excavation shall be managed pursuant to applicable state, and federal regulations including, but not limited to the management of solid waste pursuant to 310 CMR 19.000. In the event that the waste materials cannot be immediately transported off site for disposal, the waste materials shall be placed in a secure container lined with a 6-mil polyethylene liner and covered for temporary storage. The Engineer of Record shall monitor the temporary containers to ensure they are properly maintained until the material can be transported for off-site disposal.
10. All excess construction soils generated by the project (estimated to be approximately 50 cubic yards) shall be placed in the excavate storage area located at the western end of the site as shown in the Application. At the conclusion of each day, the excess construction soils shall be covered with a tarp. Upon completion of the placement of excess construction soils in the designated excavate storage area, final cover of the excavate storage area shall be constructed that consists of two and one-half feet of clean fill and a six-inch layer of topsoil. The excavate storage area and all areas disturbed during construction shall be stabilized and seeded.
11. The activities subject to this decision shall be carried out in a sanitary, orderly, and dependable manner.
12. Pursuant to 310 CMR 19.142(7), *Additional Measures*, MassDEP reserves the right to require additional measures be taken, including assessment and corrective action pursuant to 310 CMR 19.150, *Landfill Assessment Requirements*, and 310 CMR 19.151, *Corrective Action Requirements*.

13. MassDEP reserves the right to rescind, suspend or modify this approval based upon a determination that the project causes or contributes to the development of nuisance conditions, is not being operated safely or in accordance with this approval, or results in a threat to the public health, safety, or the environment.

NOTICE OF RIGHT TO APPEAL

The City of Watertown (the City) is hereby notified that it may within twenty-one (21) days file a request that this decision be deemed a provisional decision under 310 CMR 19.033(4)(b), by submitting a written statement of the basis on which the City believes it is aggrieved, together with any supporting materials. Upon timely filing of such a request, the decision shall be deemed a provisional decision with an effective date twenty-one (21) days after the Department's receipt of the request. Such a request shall reopen the administrative record, and the Department may rescind, supplement, modify, or reaffirm its decision. Failure by the City to exercise the right provided in this section shall constitute a waiver of the City's right to appeal.

Appeal. Any person aggrieved by the issuance of this decision, except as provided for under 310 CMR 19.033(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A, and M.G.L. c. 30A, not later than thirty (30) days following the receipt of the final decision. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the decision by a court of competent jurisdiction, the decision shall remain effective.

Notice of Action. Any aggrieved person intending to appeal this decision to the Superior Court shall first provide notice to the Department of their intention to commence such action. Said notice of intention shall include the Department file number and shall identify with particularity the issues and reasons why it is believed the decision was not proper. Such notice shall be provided to the Office of General Counsel of the Department and the Regional Director for the regional office which processed the application. The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street - 3rd Floor
Boston, MA 02108

and

Eric Worrall, Regional Director
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

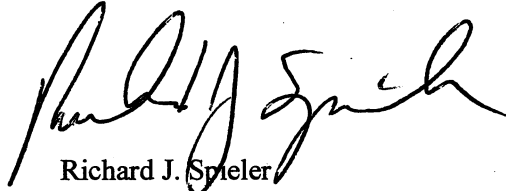
No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that a matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the environmental impact of the permitted activity.

If you have any questions regarding this matter, please contact Richard Spieler by email to:
richard.spieler@mass.gov.

Sincerely,



Mark G. Fairbrother
Section Chief
Solid Waste Management



Richard J. Spieler
Environmental Engineer
Solid Waste Management

MGF/RJS/rjs

Enclosure: Communication for Non-English-Speaking Parties

cc: Watertown Board of Health
Administration Building
149 Main Street
Watertown, MA 02472

Mary Mancini, P.E. (CDM Smith, Inc.)
Email: mancinimc@cdmsmith.com

Glenn Howard (CDM Smith, Inc.)
Email: howardgd@cdmsmith.com