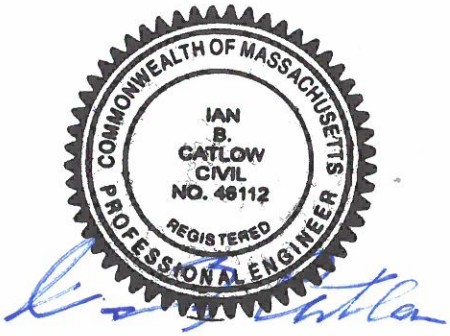
Project Manual
Volume 1 of 1

Pump Station Maintenance and Improvements Project

Westwood, MA

November, 2016



Tighe&Bond
1 University Ave, Suite 104
Westwood, MA 02090

Pump Station Maintenance and Improvements Project
Westwood, MA

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TOWN OF WESTWOOD

SEWER COMMISSION

WESTWOOD, MASSACHUSETTS

ADVERTISEMENT FOR BIDS

Sealed Bids for the construction of the "Town of Westwood, Pump Station Maintenance & Improvements Project, Contract No. DPW-17-C-011 - Town Bid No. DPW-17-B-011" will be received by the Procurement Department at the Westwood Town Hall, 580 High Street, Westwood, MA 02090 until 11:00 a.m. local time on December 22, 2016 at which time the Bids received will be publicly opened and read. Sealed Bids must have outer envelope marked as "Town of Westwood, Pump Station Maintenance & Improvements Project, Contract No. DPW-17-C-011 - Town Bid No. DPW-17-B-011."

Sealed Bids from Subcontractors addressed as referenced above will be received by the Procurement Department at the Westwood Town Hall, 580 High Street, Westwood, MA 02090 until 11:00 a.m. on December 8, 2016 and then at said office publicly opened and read aloud. Sub-Bids with the required Bid deposit will be received for the following items of work:

Subtrades

Electrical Work

The work consists of upgrades to multiple pump stations. The Conant Road Pump Station upgrade includes replacement of 5 sluice gates and installation of emergency lighting, while the Stevens Farm Road Pump Station upgrade includes installation of an internal barrier in the electrical panel. Upgrades to the Arcadia Road Pump Station include replacement of existing electrical fixtures, installation of motor control center (MCC) ventilation, demolition of existing abandoned wiring, and replacement of non-explosion proof pushbuttons with explosion proof pushbuttons in the wet well. Additionally, the Sycamore Road Pump Station will be upgraded to include installation of intrinsically safe relays in the pump controls, and separation of power and control wiring in the control panel, and the Brook Street Pump Station will be upgraded to include replacement of one of the existing pumps, replacement of 5 sluice gates, repairs to existing damaged conduit, installation of MCC fans/louvers, and replacement of the existing programmable logic controller (PLC). Bids shall be on a lump sum basis.

All Bids for this project are subject to the provisions of Massachusetts General Laws Chapter 149, Section 44A - 44J inclusive as amended.

In accordance with Section 44D of Chapter 149 of the General Laws of Massachusetts as amended, the prospective General Bidders and Filed Sub-Bidders must submit with their Bid, a certificate of eligibility issued by the Division of Capital Asset Management (DCAM), showing that the Bidder has been approved to bid on projects of the size and nature as advertised herein. Prospective General Bidders and Filed Sub-Bidders must also submit an updated statement summarizing their record for the period between the latest DCAM certificate and the date of the Bid submittal. The DCAM certificate of eligibility to be submitted by the General Bidder shall be for the category of work defined as "Sewage and Water Treatment Plants". The DCAM certificate of eligibility to be submitted by the Filed Sub-Bidders shall be for the category of work for which they are submitting a Bid.

Bidding Documents may be obtained electronically from the Town of Westwood website at:

http://www.townhall.westwood.ma.us/index.cfm/page/Procurement-Requests/pid/27876

To receive Bid Documents, Prospective Bidders must complete a Contact Form on the website above. If there are Addenda issued, notification will be made using information supplied on the Contact Form. Bidding documents may also be examined at the office of Tighe & Bond, Inc., One University Avenue, Westwood, Massachusetts between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday, legal holidays excluded. Bidding documents may also be examined at the Westwood Department of Public Works Office, 50 Carby Street, Westwood, Massachusetts between the hours of 7:00 a.m. and 3:00 p.m., Monday through Friday, legal holidays excluded.

A bid deposit shall be furnished in accordance with the Instructions to Bidders.

Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Section 26 to 27D, 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 trades people who may be employed for the proposed Work under this Contract.

A recommended Pre-Bid meeting will be held at 10:00 a.m. on Thursday December 1, 2016 at the Department of Public Works Office, 50 Carby Street, Westwood, Massachusetts 02090. A brief presentation will be followed by a tour of the pump stations. While attendance at the Pre-Bid meeting is not mandatory, all vendors are highly encouraged to attend.

TOWN OF WESTWOOD, MASSACHUSETTS

Consulting Engineer:

Tighe & Bond, Inc.

Attn: Dan Roop

One University Avenue, Suite 104

Westwood, MA 02090

781-708-9820

END OF SECTION

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TOWN OF WESTWOOD

COMMONWEALTH OF MASSACHUSETTS

INVITATION FOR BIDS

Westwood Pump Station Maintenance & Improvement Project

Bid # DPW-17-B-011

I. GENERAL INFORMATION AND BID SUBMISSION REQUIREMENTS

- Bids must be delivered in a manner such that the package is hand-delivered to a Westwood Town Hall employee. If the bidder is using a delivery service, the package must be signed for by a Westwood Town Hall staff to be considered properly delivered.

- All General Bids must be delivered by **11:00 am on Thursday, December 22, 2016** to:

  Procurement Department
  Westwood Town Hall
  580 High Street
  Westwood MA 02090

- All Sub-Bids must be must be delivered by **11:00 am on Thursday, December 8, 2016** to the address referenced above.

- Bids received after the time and date established herein **SHALL NOT** be accepted or considered, regardless of the cause for delay in the receipt of such bid(s).

- If, at the time of the scheduled bid due date, the Westwood Town Hall is closed due to uncontrolled events such as fire, wind, or building evacuation, the bid opening will be postponed until 12:00 noon on the next normal business day. Bids will be accepted until that date and time.

Submit the bid in a sealed envelope clearly marked "***Bid # DPW-17-B-011, Westwood Pump Station Maintenance & Improvement Project."***

- A Pre-Bid meeting will be conducted on **Thursday, December 1, 2016 at 10:00am** at 50 Carby Street, Westwood, MA 02090 with pump station walk-throughs immediately following the Pre-Bid meeting. While attendance at the Pre-Bid meeting is not mandatory, all vendors are highly encouraged to attend.

- **The bids shall be completed on the Form For General Bid, Section 00410 and Form For Sub-Bid, Section 00420.**

- **The bid must include the documents listed below.**
  - Bid deposit in the amount of five percent of the total amount of Bid
  - Evidence of authority to sign
  - Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids
  - Evidence of Bidder's qualifications in accordance with Article 3 of Section 00200

- DCAM Certificate of Eligibility
- DCAM Update Statement
- List of Subcontractors
- Reference List
- Attachment A - Labor Harmony and OSHA Training
- Attachment B – Certificate of Non-Collusion
- Attachment C – Tax Compliance Certificate
- Attachment D –Signature Page

- **The bid <u>must</u> also include a Bid Signature Form (Attachment D).** When the Bid Signature Form is completed, it declares:
  - The only parties interested in this bid are the Principals named herein.
  - No officer, agent or employee of the Town of Westwood has a direct or indirect interest in this bid.

TOWN OF WESTWOOD

COMMONWEALTH OF MASSACHUSETTS

SECTION 00200

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

1. Defined Terms
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3. Qualifications of Bidders
4. Site and Other Areas; Existing Site Conditions; Examination of Site; Owner's Safety Program; Other Work at the Site
5. Bidder's Representations
6. Pre-Bid Conference
7. Interpretations and Addenda
8. Bid Deposit
9. Contract Times
10. Liquidated Damages
11. Substitute and "Or Equal" Items
12. Subcontractors, Suppliers, and Others
13. Preparation of Bid
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25. Massachusetts Prevailing Wage Rates
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TOWN OF WESTWOOD

COMMONWEALTH OF MASSACHUSETTS

ARTICLE 1 DEFINED TERMS

1.1 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions.

ARTICLE 2 COPIES OF BIDDING DOCUMENTS

2.1 Refer to Advertisement for Bids for information on examination and procurement of documents.

2.2 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 QUALIFICATIONS OF BIDDERS

3.1 Bidders shall be experienced in the kind of Work to be performed, shall have the necessary equipment, and shall possess sufficient capital to properly execute the Work within the time allowed. Bids received from Bidders who have previously failed to complete Work within the time required, or who have previously performed similar Work in an unsatisfactory manner, may be rejected. A Bid may be rejected if Bidder cannot show that he has the necessary ability, plant and equipment to commence the Work at the time prescribed and thereafter to prosecute and complete the Work at the rate or within the time specified. A Bid may be rejected if Bidder is already obligated for the performance of other Work which would delay the commencement, prosecution or completion of the Work.

3.2 Bidders shall demonstrate extensive experience in the upgrade of wastewater pumping stations. A minimum of five projects of similar scope shall have been successfully completed by the Bidder within the past five years. Submit with the bid a summary of experience and representative projects to show compliance with these qualifications.

3.3 Bidders or members of the bidder's team performing medium voltage terminations shall have completed similar medium voltage equipment replacement work <u>on 5 different pumping station facilities in the last 5 years</u>. Completed projects shall be of comparable size to the equipment being replaced at this facility. Submit with the bid a summary of experience and representative projects to show compliance with these qualifications.

3.4 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. The investigation of a Bidder will seek to determine whether the organization 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. Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of such Bidder fails to satisfy Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.

3.5 In accordance with Section 44D of Chapter 149 of the General Laws of Massachusetts as amended, the prospective General Bidders and Filed Sub-Bidders must submit, to Owner with their bid, a certificate of eligibility issued by the Division of Capital Asset Management (DCAM), showing that the Bidder has been approved to bid on projects of the size and nature as advertised herein. Prospective General Bidders and Filed Sub-Bidders must also submit an updated statement summarizing their record for the period between the latest DCAM certificate and the date of the bid submittal. The DCAM certificate of eligibility to be submitted by Prospective General Bidder shall be for the category of Work defined as "Sewage and Water Treatment Plants" and for the Filed Sub-Bidders shall be for the respective trade for which they are submitting a Bid.

ARTICLE 4 SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.1 The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment are to be obtained and paid for by Contractor.

4.2 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. No such data is available.

2. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 5.06 of the General Conditions.

4.3 *Site Visit and Testing by Bidders*

A. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

B. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.

C. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

D. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.4 *Other Work at the Site*

A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work for which a Bid is to be submitted. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 BIDDER'S REPRESENTATIONS

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

A. examine and carefully study the Bidding Documents, including any Addenda, data, and referenced items identified in the Bidding Documents;

B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, or performance of the Work;

D. carefully study all reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or adjacent to the Site which have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and carefully study all reports and drawings relating to a Hazardous Environmental Condition, if any, at or adjacent to the Site which have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;

E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports

and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on 1) the cost, progress, and performance of the Work; 2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, , and 3) Bidder's safety precautions and programs;

F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the Work to be performed by Owner and others at the site that relates to the Work as indicated in the Bidding Documents;

H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and finishing of the Work; and

J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 PRE-BID CONFERENCE

6.1 A pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 INTERPRETATIONS AND ADDENDA

7.1 All questions about the meaning or intent of the Bidding Documents shall be submitted in writing to procurement@townhall.westwood.ma.us. Prospective bidders must be registered users of the web site to submit questions regarding the project. In order to receive consideration, questions must be received at least five days prior to the date fixed for the opening of Bids. Interpretations or clarifications in response to such questions will be issued by Addenda to all parties recorded as having received the Bidding Documents. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.2 Addenda may be issued to clarify, correct, supplement or change the Bidding Documents. Such Addenda, if any, will be issued in the manner and within the time period stated in paragraph 7.1.

7.3 The Bidder must acknowledge receipt of each Addendum, if any, in the space provided on the Bid Form.

ARTICLE 8 BID DEPOSIT

8.1 In the Bidding Documents, the terms "Bid security" and "Bid deposit" shall have the same meaning.

8.2 Bids must be accompanied by a Bid deposit in the amount of 5% of the Bidder's maximum Bid price (including any additive alternates) and in the form of a bid bond payable to the Owner.

8.3 All Bid deposits of General Bidders, except those under consideration by Owner, will be returned within 5 days, excluding Saturdays, Sundays and legal holidays, after the opening of General Bids. Other Bid deposits will be returned upon the execution and delivery of the Agreement. The Bid deposit of the Successful Bidder will be retained until such bidder has furnished the required contract security and executed the Agreement, whereupon the bid deposit shall be returned. If the Successful Bidder fails to furnish the required contract security within 15 days after the Notice of Award and execute the Agreement within 5 days after receipt from Owner, Owner may annul the Notice of Award and the Bid deposit of that Bidder will be forfeited to Owner as liquidated damages for such failure.

8.4 All Bid deposits of Filed Sub-bidders will be returned within 5 days, excluding Saturdays, Sundays and legal holidays, after the opening of the General Bids, except

A. those of the Sub-bidders named in the General Bids of the three lowest responsible and eligible General Bidders, and

B. those of the three lowest and responsible and eligible Sub-bidders for each sub-trade.

C. the Bid deposits of Sub-bidders not returned pursuant to the provisions of the preceding sentence will be returned within 5 days, excluding Saturdays, Sundays and legal holidays, after the execution of the Agreement.

ARTICLE 9 CONTRACT TIME

9.1 The number of days within which, or the dates by which, the Work is to be:

A. substantially completed, and/or

B. completed and ready for final payment

are set forth in the Agreement.

ARTICLE 10 LIQUIDATED DAMAGES

10.1 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 SUBSTITUTE AND "OR EQUAL" ITEMS

11.1 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or equal" items. In cases in which the

Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the effective date of the Contract.

ARTICLE 12 SUBCONTRACTORS, SUPPLIERS, AND OTHERS (NOT USED)

ARTICLE 13 PREPARATION OF BID

13.1 A Bid must be made on the Bid form included with the Project Manual. The Bid form shall not be altered in any way.

13.2 The Bid form must be completed in ink. Blank spaces in the Bid form must be filled in correctly where indicated, and the Bidder must state, both in words and numerals, the prices for which he proposes to complete each and every item of Work. Ditto marks shall not be used.

13.3 A Bidder shall execute his Bid as stated below.

A. A Bid by an individual shall show the Bidder's name and official address.

B. A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature) accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

C. A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature) and must be accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the corporate secretary. The state of incorporation and the official corporate address shall be shown.

D. A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

E. A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

F. All names must be printed in ink below the signature.

13.4 The Bid shall contain an acknowledgment of the receipt of all Addenda in the space provided on the Bid form.

13.5 Postal and email addresses and telephone number to which communications regarding the Bid are to be directed shall be shown.

13.6 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

13.7 In order to be considered for selection, the Bidder must submit a complete bid package in accordance with these Bidding Documents. Partial Bids will not be accepted. Refer to the Bid Form for a list of documents that shall be submitted in addition to the Bid Form.

13.8 Any deviations in completion of the Bid Form and accompanying documents from the instructions provided in this Article may be cause for rejection of the Bid.

ARTICLE 14 BASIS OF BID

14.1 Lump Sum

A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid form.

B. The award will be based on the lowest eligible base Bid.

14.2 Allowances

A. The Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents in accordance with paragraph 13.02 of the General Conditions.

ARTICLE 15 SUBMITTAL OF BID

15.1 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement for Bids and shall be enclosed in an opaque sealed envelope plainly marked with the Project title, the name and address of Bidder, and shall be accompanied by the Bid deposit and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED". When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bids. A mailed Bid shall be addressed to Owner at the address in the Advertisement for Bids.

15.2 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

15.3 Each Sub-bid shall also note on the envelope the notation "Sub-bid" and the name of the sub-trade for which the Sub-bid is submitted.

15.4 The form for General Bid requires the General Bidder to indicate whether the General Bidder will require Performance and Payment Bonds to be furnished by one or more filed Sub-bidders. If the General Bidder requests one or more filed Sub-bidders to furnish such bonds, the General Bidder must pay the premiums for all such bonds requested, and must include the costs of such premiums in his General Bid.

15.5 Required sub-subcontractors identified in the Specifications must be listed on the appropriate Sub-Bid forms with their corresponding bid prices in accordance with MGL c. 149, §44F.

ARTICLE 16 MODIFICATION OR WITHDRAWAL OF BID

16.1 Withdrawal Prior to Bid Opening

A. A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be

submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

16.2 Modification Prior to Bid Opening

A. If a Bidder wishes to modify its Bid prior to the Bid opening, Bidder must withdraw its initial Bid in the manner specified in paragraph 15.1.A and submit a new Bid prior to the date and time for the opening of Bids.

ARTICLE 17 OPENING OF BIDS

17.1 Bids will be opened as indicated in the Advertisement for Bids and publicly read aloud.

17.2 In order to be considered for selection, Bids must arrive at the designated location on or before the date and time specified in the Advertisement for Bids. Bidders mailing their Bids should allow for normal mail delivery time to ensure timely receipt of their Bids by Owner.

17.3 Bids received by mail or otherwise after the time specified for the opening of Bids will not be accepted and will be returned to the Bidder unopened.

17.4 No responsibility will attach to Owner, its employees or the Engineer for premature opening of a Bid not properly addressed and identified in accordance with the Bidding Documents.

ARTICLE 18 DISQUALIFICATION OF BIDDERS

18.1 More than one Bid for the same Work from an individual, or a firm, partnership, corporation or an association under the same or different names will not be considered. Reasonable grounds for believing that any Bidder is interested in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder is interested.

ARTICLE 19 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 20 EVALUATION OF BIDS AND AWARD OF CONTRACT

20.1 Owner reserves the right to reject any and all Bids, to waive any and all informalities, and the right to disregard all nonconforming, nonresponsive or conditional Bids.

20.2 Owner reserves the right to reject any Bid not accompanied by specified documentation and Bid deposit.

20.3 Owner reserves the right to reject any Bid if it shows any omissions, alterations of form, additions not called for, conditions or qualifications, or irregularities of any kind.

20.4 Owner reserves the right to reject any Bid that, in his sole discretion, is considered to be unbalanced or unreasonable as to the amount bid for any lump sum or unit price item.

20.5 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

20.6 In evaluating whether a Bidder is responsible, Owner will consider the qualifications the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

20.7 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

20.8 If the Owner awards the Contract for the Work, such award shall be to the responsible Bidder (who has neither been disqualified nor rejected pursuant to Article 18 or this Article 20) submitting the lowest responsive Bid.

20.9 Contents of the Bid of the Successful Bidder will become part of any contract awarded.

ARTICLE 21 CONTRACT SECURITIES

21.1 Performance and payment bonds shall be furnished by the successful Bidder. The amounts of and other requirements for performance and payment bonds are stated in Article 6 of the General Conditions. Performance and payment bonds submitted shall be posted by a recognized surety company having a place of business in the Commonwealth of Massachusetts. All performance and payment bonds signed by an agent must be accompanied by a certified copy of the authority to act. Performance Bonds and Payment Bonds shall be submitted on the forms included in Sections 00610 and 00615, respectively, of the Contract Documents. Additional requirements may be stated in the General or Supplementary Conditions.

21.2 Within five days of receiving the Agreement, Saturdays, Sundays and legal holidays excluded, the Successful Bidder shall deliver to Owner and Engineer, for review and approval, the performance bond and the payment bond he proposes to furnish at the time of the execution of the Agreement.

21.3 The required contract securities will become part of the Contract Documents.

21.4 A performance and payment bond furnished by a Subcontractor, at the request of a General Contractor set forth in the form for General Bid, shall be for the benefit of the General Contractor; shall secure the performance of the sub-contract by the Subcontractor; and shall indemnify and hold harmless the General Contractor and the surety or sureties under the payment bond furnished by such General Contractor to Owner against (1) any and all loss and expense arising out of any and all claims in connection with the performance of said Subcontract which would be required to be paid under the Payment bond furnished by the General Contractor to Owner and (2) attorney's fees in the event that the Subcontractor, after notice, fails to assume the defense of and defend such claims.

ARTICLE 22 CONTRACT INSURANCE

22.1 The requirements for insurance to be provided by the Successful Bidder are stated in Article 6 of the General Conditions and in the Supplementary Conditions.

22.2 Within five days of receiving the Agreement, Saturdays, Sundays and legal holidays excluded, the Successful Bidder shall deliver evidence of required insurance to Owner and Engineer.

22.3 The required insurance certificates will become part of the Contract Documents.

ARTICLE 23 SIGNING OF AGREEMENT

23.1 The Owner will transmit the required number of unsigned Agreements to the Successful Bidder with the Notice of Award. Within five days of receiving the Agreement, Saturdays, Sundays and legal holidays excluded, the Successful Bidder shall sign the Agreements and return them to the Owner. The Owner will return one executed Contract to the Successful Bidder.

ARTICLE 24 SALES TAXES

24.1 Owner is exempt from Massachusetts State sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. The tax exemption number will be provided to the Successful Bidder.

ARTICLE 25 MASSACHUSETTS PREVAILING WAGE RATES

25.1 Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. The Wage Rate Determination is included as Attachment A to the Supplementary Condition, Section 00800.

25.2 It is the responsibility of the Bidder before bid opening to request any additional information on Minimum Wage Rates for those tradespeople who may be employed for the proposed Work under this Contract.

ARTICLE 26 COMPETITIVE BIDDING

26.1 The bidding and the Award of the Contract and Subcontracts shall be in full compliance with Chapter 149, Sections 44A to 44J inclusive of the General Laws of the Commonwealth of Massachusetts as amended. Bids from General Contractors shall be for the complete project as specified and shall include the names of all Subcontractors designated in the Bid Form, and the General Contractor shall be selected on the basis of such Bid. Each General Bid shall be divided into two parts.

A. Part I - The Work of the General Contractor being all Work other than that covered by Part II.

B. Part II - The Work of all Subcontractors and the Bid prices therefore as listed in the Form for General Bid attached hereto.

26.2 As required by law, filed Sub-bids for each of the following classes of Work will be received at the time and place stated in the Advertisement for Bids:

<u>CLASS OF WORK</u>

Electrical Work

END OF SECTION

TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

ATTACHMENT A
LABOR HARMONY AND OSHA TRAINING

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

_____
(Signature of authorized individual submitting proposal)

_____
(Printed Name)

_____
(Name of Bidder (if different than name))

_____
(Date)

TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

ATTACHMENT B
CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal 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.

_____
Signature of individual submitting bid or proposal

_____
Printed Name of individual submitting bid or proposal

_____
Name of business

TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

ATTACHMENT C

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

Signed under the penalties of perjury.

_____
Signature of individual submitting bid or proposal

_____
Printed Name of individual submitting bid or proposal

_____
Name of business

TOWN OF WESTWOOD
COMMONWEALTH OF MASSACHUSETTS

ATTACHMENT D
SIGNATURE PAGE

This Bid must bear the written signature of the Bidder or authorized agent of the Bidder. If the Bidder is a corporation or a partnership, the Bid must be signed by a duly authorized officer of such corporation or by a partner; the title of such officer must be stated.

The bidder hereby acknowledges the receipt of, and has included in this BID, the following Addenda:

(To be filled in by Bidder, if Addendums are issues.)

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

_____

Signature

_____

Name of Corporation, Company or Individual

_____

Printed Name of Person Authorized to Sign

_____

Title

_____

Email Address

TOWN OF WESTWOOD

COMMONWEALTH OF MASSACHUSETTS

SECTION 00410

FORM FOR GENERAL BID

PROJECT IDENTIFICATION:

Town of Westwood, Pump Station Maintenance & Improvement Project

TABLE OF ARTICLES

1. Bid Recipient
2. Bidder's Acknowledgements
3. Bidder's Representations
4. Bidder's Certifications
5. Basis of Bid
6. Time of Completion
7. Attachments to This Bid
8. Bid Submittal

ARTICLE 1 - BID RECIPIENT

1.1 This Bid is submitted to:

Town of Westwood

Procurement Department

580 High Street

Westwood, MA 02090

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

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.1 Bidder accepts all of the terms and conditions of the Advertisement for Bids and Instructions to Bidders, including without limitation, those dealing with the disposition of Bid deposit. The Bid will remain subject to acceptance for 30 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.1 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents and hereby acknowledges the receipt of all Addenda.

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.1 Bidder certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work, that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee, and that Bidder will comply fully with all laws and regulations applicable to awards made subject to MGL Chapter 149, Section 44A.

4.2 Bidder certifies that, under penalty of perjury, Bidder is not presently debarred from doing public construction work in the Commonwealth under the provisions of MGL Chapter 29, Section 29F or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation 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.

4.3 Bidder hereby certifies under the penalties of perjury, to the best of Bidder's knowledge and belief, that Bidder has filed all State tax returns and paid all State taxes required by law.

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

4.5 Bidder certifies that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

4.6 Bidder certifies that Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

4.7 Bidder certifies that Bidder has not solicited or induced any individual or entity to refrain from bidding.

4.8 Bidder certifies that Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

A. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

B. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of the Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

C. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

D. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

5.1 Bidder proposes to furnish all labor and materials required for construction of the Town of Westwood Pump Station Maintenance & Improvements Project, Westwood, MA in accordance with the accompanying Bidding Documents prepared by Tighe & Bond, Inc., for the Contract Price specified below, subject to additions and deductions according to the terms of the Bidding Documents.

5.2 This Bid includes Addenda numbered _____.

5.3 The proposed Contract Price (base bid including Sub-Bids) is:

_____ dollars
(words)

($_____)

(figures)

5.4 The subdivision of the proposed Contract Price (base bid) is as follows:

Item 1 – Pump Stations Improvements: The work of the General Contractor, being all Work other than that covered by Item 2.

_____ dollars
(Bid in words)

($_____)

(figures)

Item 2: Sub-Bids as follows:

Sub-Trade	Name of Sub-Bidder	Base Bid Amount	Bonds required indicated by "Yes" or "No"*
Electrical Work			
Total of Item 2: $_____			

*Failure to fill in any or all spaces in the Bonds Required column will be construed as an entry of the word "no."

5.5 Bidder agrees that each of the above named Sub-Bidders will be used for the work indicated at the amount stated, unless a substitution is made. Bidder further agrees to pay

the premiums for the performance and payment bonds furnished by Sub-Bidders as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item 1 of this Bid.

5.6 Bidder agrees, if this Bid is accepted, to promptly confer with Owner on the question of Sub-Bidders, and that Owner may substitute for any Sub-Bid listed above a Sub-Bid filed with Owner by another Sub-Bidder for the sub-trade against whose standing and ability Bidder makes no objection; and that Bidder will use all such finally selected Sub-Bidders at the amounts named in their respective Sub-Bids and be in every way as responsible for them and their work as if they had been originally named in this General Bid, the total Contract Price being adjusted to conform thereto.

ARTICLE 6 - TIME OF COMPLETION

6.1 Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.2 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times as stated in the Agreement.

ARTICLE 7 - ATTACHMENTS TO THIS BID

7.1 The following documents are attached to and made a condition of this Bid:

A. Bid deposit in the amount of _____ dollars ($_____ _____), consisting of a bid bond in the amount of five percent of the total amount of Bid

B. Evidence of authority to sign

C. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids

D. Evidence of Bidder's qualifications in accordance with Article 3 of Section 00200

E. DCAM Certificate of Eligibility

F. DCAM Update Statement

G. List of Subcontractors

H. List of Project References

I. Labor Harmony and OSHA Training

J. Certificate of Non-Collusion

K. Tax Compliance Certificate

L. Signature Page

TOWN OF WESTWOOD

COMMONWEALTH OF MASSACHUSETTS

ARTICLE 8 - BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

END OF SECTION

SECTION 00420

FORM FOR SUB-BID

PROJECT IDENTIFICATION:

Town of Westwood Pump Station Maintenance & Improvements Project

Sub-Trade: **Electrical**

TABLE OF ARTICLES

1. Bid Recipient

2. Bidder's Acknowledgements

3. Bidder's Representations

4. Bidder's Certifications

5. Basis of Bid

6. Attachments to This Bid

7. Bid Submittal

ARTICLE 1 - BID RECIPIENT

1.1 This Sub-Bid is submitted to:

All General Bidders Except those Excluded

1.2 The undersigned Sub-Bidder proposes and agrees, if this Sub-Bid is accepted, to enter into a Subcontract with the General Bidder selected as Contractor to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Sub-Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.1 Sub-Bidder accepts all of the terms and conditions of the Advertisement for Bids and Instructions to Bidders, including without limitation, those dealing with the disposition of Bid Security. The Sub-Bid will remain subject to acceptance for 30 days after the General Bid opening, or for such longer period of time that Sub-Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.1 In submitting this Sub-Bid, Sub-Bidder represents, that:

A. Sub-Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents and hereby acknowledges the receipt of all Addenda.

B. Sub-Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the

general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Sub-Bidder is familiar with and has satisfied itself as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Sub-Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Sub-Bidder has considered the information known to Sub-Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Sub-Bidder; and (3) Sub-Bidder's safety precautions and programs.

F. Sub-Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Sub-Bid for performance of the Work at the price bid and within the times required and in accordance with the other terms and conditions of the Bidding Documents.

G. Sub-Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Sub-Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Sub-Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Sub-Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Sub-Bid constitutes an incontrovertible representation by Sub-Bidder that Sub-Bidder has complied with every requirement of this Article, and that without exception the Sub-Bid and all prices in the Sub-Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.1 Sub-Bidder hereby certifies that Sub-Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins

work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee, and that Sub-Bidder will comply fully with all laws and regulations applicable to awards of subcontracts subject to Chapter 149, Section 44F.

4.2 Sub-Bidder further certifies under penalties of perjury that this Sub-Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

4.3 Sub-Bidder certifies that, under penalty of perjury, Sub-Bidder is not presently debarred from doing public construction work in the Commonwealth under the provisions of MGL Chapter 29, Section 29F or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation 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.

4.4 Sub-Bidder hereby certifies under the penalties of perjury, to the best of Sub-Bidder's knowledge and belief, that Sub-Bidder has filed all State tax returns and paid all State taxes required by law.

4.5 Sub-Bidder certifies that this Sub-Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

4.6 Sub-Bidder certifies that Sub-Bidder has not directly or indirectly induced or solicited any other Sub-Bidder to submit a false or sham Sub-Bid.

4.7 Sub-Bidder certifies that Sub-Bidder has not solicited or induced any individual or entity to refrain from bidding.

4.8 Sub-Bidder certifies that Sub-Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

A. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

B. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of the Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

C. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

D. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

5.1 Sub-Bidder proposes to furnish all labor and materials required for completing, in accordance with the Bidding Documents, all the Work specified in Section No. _____, of the Specifications and in any Drawings or specification sections

specified in such section, prepared by Tighe & Bond, Inc. for construction of the Town of Westwood Pump Station Maintenance & Improvement Project.

5.2 This sub-Bid includes addenda numbered _____.

5.3 The proposed Contract Price (base bid) is:

_____ dollars
(words)

($ _____)
(figures)

5.4 This Sub-Bid

[ ] may be used by any general bidder except:

_____

_____

[ ] may only be used by the following general bidders:

_____

_____

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer 5.4 if no General Bidders are excluded.)

5.5 Sub-Bidder agrees that, if this Sub-Bid is selected, Sub-Bidder will, within five days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the General Contractor, execute with such General Bidder a subcontract in accordance with the terms of this Sub-Bid.

5.6 If this Sub-Bid is selected, and, if requested in the General Bid by the successful General Bidder, Sub-Bidder agrees to furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth, in the full sum of the Subcontract price. Performance and payment bonds shall be furnished at the time of subcontract execution. General Bidder will pay the premiums for performance and payment bonds.

5.7 The names of all persons, firms and corporations furnishing to the undersigned Sub-Bidder labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the Specifications for this sub-trade require a listing in this paragraph, including the undersigned Sub-Bidder if customarily furnished by persons on Sub-Bidder's own payroll and in the absence of a contrary provision in the Specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____

(Do not give bid price for any class or part thereof furnished by undersigned Sub-Bidder)

5.8 Sub-Bidder agrees that the above list of bids to the Sub-Bidder represents bona fide bids based on the Bidding Documents and that, if the Sub-Bidder is awarded the subcontract, they will be used for the work indicated at the amounts stated, if satisfactory to Owner.

5.9 Sub-Bidder further agrees to be bound to Contractor by the terms of the Contract Documents, and to assume toward Contractor all the obligations and responsibilities that Contractor, by those documents, assumes toward Owner.

5.10 Sub-Bidder offers the following information as evidence of Sub-Bidder's qualifications to perform the work as bid upon according to all the requirements of the Contract Documents:

1. Have been in business under present business name _____ years.

2. Ever failed to complete any work awarded? _____

3. List one or more recent contracts with names of the general contractor and architect or engineer on which you served as a subcontractor for work of similar character as required for the above-named building.

	Building	Architect/ Engineer	General Contractor	Amount of Contract
(a)	_____	_____	_____	_____
(b)	_____	_____	_____	_____
(c)	_____	_____	_____	_____

4. Bank reference _____

ARTICLE 6 - ATTACHMENTS TO THIS BID

6.1 The following documents are attached to and made a condition of this Sub-Bid:

A. Bid deposit in the amount of _____ dollars ($_____), consisting of a bid bond in the amount of five percent of the total amount of Bid

B. Evidence of authority to sign

C. DCAM Certificate of Eligibility

D. DCAM Update Statement

E. Evidence of Bidder's qualifications in accordance with Article 3 of section 00200.

ARTICLE 7 - BID SUBMITTAL

SUB-BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Sub-Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Sub-Bidder's License No.: _____
(where applicable)

END OF SECTION

J:\W\W2061 Westwood PS Eval\SPEC\Div 00\00420 Form for Sub-bid.doc

BID BOND

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

BIDDER *(Name and Address)*:

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

OWNER *(Name and Address)*:

BID
Bid Due Date:
Description *(Project Name— Include Location)*:

BOND
Bond Number:
Date:
Penal sum _____ $ _____
(Words) (Figures)

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

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
Title	Title

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

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Notice of Award

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Bidder:	
Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*	

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars ($_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

   _____

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

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

_____
Owner

By:_____
Authorized Signature

_____
Title

Copy to Engineer

Notice to Proceed

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Contractor:	
Contractor's Address: *[send Certified Mail, Return Receipt Requested]*	

You are notified that the Contract Times under the above Contract will commence to run on_____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is_____, and the date of readiness for final payment is _____ [(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

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

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

_____ *[add other requirements].*

_____ _____
Owner
Given by:

_____ _____
Authorized Signature

_____ _____
Title

_____ _____
Date

Copy to Engineer

SECTION 00520

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT

This Agreement is by and between the Town of Westwood, as requested by its Sewer Commission hereinafter called Owner and _____ hereinafter called Contractor.

Owner and Contractor hereby agree as follows:

ARTICLE 1 WORK

1.1 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described with the following title: "Town of Westwood, Pump Station Maintenance & Improvement Project, Contract No. DPW-17-C-011 - Town Bid No. DPW-17-B-011".

ARTICLE 2 ENGINEER

2.1 The part of the Project that pertains to the Work has been designed by Tighe & Bond, Inc

2.2 The Owner has retained Tighe & Bond ("Engineer") to act as Owner's representative, assuming all duties and responsibilities, rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 3 CONTRACT TIMES

3.1 Time of the Essence

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

3.2 Substantial Completion and Final Payment

A. The Work will be substantially completed within 180 days from the date of the Notice to Proceed and completed and ready for final payment in accordance with paragraph 15.06 of the General Conditions within 210 days from the date of the Notice to Proceed.

3.3 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 3.1 above and that Owner will suffer financial and other losses if the Work is not completed within the times specified in Paragraph 3.2 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner $1000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in

Paragraph 3.1 above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract), for completion and readiness for final payment, Contractor shall pay Owner $1000 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 4 CONTRACT PRICE

4.1 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount equal to the prices stated in Contractor's Bid, attached hereto as an exhibit, subject to adjustment under the Contract.

ARTICLE 5 PAYMENT PROCEDURES

5.1 Applications for Payment shall be processed in accordance with Article 15 of the General Conditions and in accordance with Massachusetts General Law.

5.2 Owner shall make progress payments on account of the Contract Price on the basis of processed Applications for Payment monthly during construction, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All progress payments will be measured by the Schedule of Values established as provided in the General Conditions, or in the event there is no schedule of values, as provided elsewhere in the Contract.

5.3 Owner shall retain from progress payments 5 percent of the value of Work completed.

5.4 Final Payment

A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 6 CONTRACTOR'S REPRESENTATIONS

6.1 Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 7 CONTRACT DOCUMENTS

7.1 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00520-1 to 00520-7, inclusive);
2. Performance Bond (pages 1 to 3, inclusive);
3. Payment Bond (pages 1 to 3, inclusive);
4. General Conditions (title pages, table of contents, and pages 1 to 72, inclusive);

5. Supplementary Conditions (pages 00800-1 to 00800-14, inclusive);

6. Specifications (Divisions 1 through 16);

7. Drawings (not attached but incorporated by reference) consisting of a cover sheet and sheets numbered __1___ through __10___, inclusive, with each sheet bearing the following general title: Pump Station & Maintenance Improvements Project;

8. Addenda (numbers _____ to _____, inclusive);

9. Exhibits to this Agreement (enumerated as follows):

   a. Sub Contractor's Bids (pages 00420-1 to 00420-6, inclusive);

   b. Contractor's Bid (pages 00410-1 to 00410-6, inclusive);

   c. Documentation submitted by Contractor prior to Notice of Award.

   d. _____;

10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

   a. Notice to Proceed;

   b. Work Change Directives;

   c. Change Order(s);

   d. Field Orders

B. The documents listed in Paragraph 7.1.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 8 MISCELLANEOUS

8.1 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions and the Supplementary Conditions.

8.2 Assignment of Contract

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

8.3 Successors and Assigns

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

8.4 Severability

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

8.5 Contractor Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.5:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.6 Other Provisions

A. Owner stipulates that the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and Owner has plainly shown all modifications to the standard wording of such published document to the Contractor in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. This Agreement will be effective on _____, _____ (which is the Effective Date of the Contract).

OWNER:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest _____

Title: _____

Address for giving notices:

_____

_____

_____

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution of other documents authorizing execution of Owner-Contractor Agreement.)

CONTRACTOR:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest _____

Title: _____

Address for giving notices:

_____

_____

_____

License No. _____
(Where applicable)

(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

Certified as to the availability of funds:

_____

Date

_____

Signed

_____

Title

END OF SECTION

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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

_____ *(seal)*
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest:_____
Signature

_____
Title

SURETY

_____ *(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.

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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.

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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:

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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

_____ *(seal)*
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ *(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.

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1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

   5.1 Claimants who do not have a direct contract with the Contractor,

      5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

      5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

   5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

   7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

   7.2 Pay or arrange for payment of any undisputed amounts.

   7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

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

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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:

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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

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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. §§5501 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.

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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.

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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.

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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.

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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

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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

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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,

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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.

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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.

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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.

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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

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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.

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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,

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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

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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.

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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.

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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.H 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.

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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

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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).

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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

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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.

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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).

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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.

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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 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

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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

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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.

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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 considered 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

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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.

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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.

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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

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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;

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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

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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

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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.

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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.

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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

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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.

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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 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.

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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.

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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

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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.

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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

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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

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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 11.01.C.2.a and 11.01.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

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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.

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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

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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

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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, expediters, 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.

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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.

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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

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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 special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

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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

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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:

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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

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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

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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.

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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

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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,

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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.

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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,

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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

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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.

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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.

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SECTION 00800

SUPPLEMENTARY CONDITIONS

PART 1 AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC 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.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

The address system used in the Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01 Add the following after paragraph 1.01A.4:

1.01A.4.a. Filed Sub-Bidder – The individual or entity who submits a Bid to the General Bidder for projects subject to MGL Chapter 149, Section 44F.

1.01A.4.b. General Bidder – The individual or entity who submits a Bid directly to the Owner for projects subject to MGL Chapter 149, Section 44E.

1.01A.4.c. General Contractor – The individual or entity with whom the Owner has entered into the Agreement for projects subject to MGL Chapter 149, Section 44E.

SC-1.01 Delete paragraph 1.01A.38 in its entirety and insert the following in its place:

1.01A.38. Specifications – Sections included under Division 1 through Division 16 of the Project Manual.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02 Delete paragraph 2.02A in its entirety and insert the following in its place:

2.02A Owner shall furnish to Contractor up to 2 printed or hard copies of the Drawings and Project Manual, and one copy in electronic portable document format (PDF). Additional copies will be furnished upon request at the cost of reproduction.

ARTICLE 3 –DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Replace paragraph 3.01E with the following paragraph:

3.01E In the event of conflicts, inconsistencies or discrepancies among the Contract Documents, to the extent applicable, the better quality or greater quantity of work shall be provided without change to the Contract Price. In the event of such conflicts, inconsistencies or discrepancies which do not relate to the quality or quantity of work, the Contractor shall request clarifications or interpretations from the Engineer as provided herein.

SC-3.01 Add the following new paragraph immediately after paragraph 3.01E:

3.01F 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-4.01 Delete paragraph 4.01A in its entirety and insert the following in its place:

4.01A The Contract Times will commence to run on the date specified in the Notice to Proceed.

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

SC-5.04 Add the following new paragraph immediately after paragraph 5.04D.4:

5.04D.5 Adjustment resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law Chapter 30, Section 39N referenced in Part II of the Supplementary Conditions.

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

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

B. Not used.

ARTICLE 6 - BONDS AND INSURANCE

SC-6.03 Add the following new paragraph immediately after paragraph 6.03B.3:

6.03B.4 Insurance certificate(s) shall also contain the following:

1. Confirmation that the General Liability policy covers only the Work under this Contract, with project specific limits.
2. Confirmation that automobile insurance covers all Scheduled, Hired and Non-Owned vehicles.
3. Names of all additional insureds as specified herein.

SC-6.03 Add the words "and Paragraph 6.04" after the words "Paragraph 6.03" in Paragraph 6.03I.

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

6.03.K 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 Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

Employer's Liability:	
Bodily injury, each accident	$ 1,000,000
Bodily injury by disease, each employee	$ 1,000,000
Bodily injury/disease aggregate	$ 3,000,000

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	$ 3,000,000
Products - Completed Operations Aggregate	$ 2,000,000
Personal and Advertising Injury	$ 1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$ 1,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:	
Each person	$ 1,000,000
Each accident	$ 1,000,000

Property Damage:

Each accident $ 1,000,000

4. Excess or Umbrella Liability:

Per Occurrence $ 5,000,000

General Aggregate $ 5,000,000

5. Contractor's Pollution Liability:

Each Occurrence $ _____

General Aggregate $ _____

☒ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: All Subcontractors

7. Contractor's Professional Liability:

Each Claim $ _____

Annual Aggregate $ _____

8. Architects and Engineer's Professional Liability:

Each Occurance $ 1,000,000

Annual Aggregate $ 3,000,000

SC-6.04 Delete paragraph 6.04 in its entirety and insert the following in its place:

6.04 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 insureds. This insurance shall provide coverage for not less than the following amounts:

Bodily Injury	$ 1,000,000	Each Occurrence
	$ 3,000,000	Aggregate
Property Damage	$ 1,000,000	Each Occurrence
	$ 3,000,000	Aggregate

A. Insurance coverage for the Contractor's Comprehensive General and Excess Liability policies and for the Owner's Protective Liability policy shall be written by one and the same insurance company to avoid the expense of duplicate and/or overlapping coverage and to facilitate and expedite the settlement of claims.

B. The Owner's Protective Liability policy shall protect from claims which may arise from operations under the Contract, including operations performed for a named insured by independent contractors and general inspection or monitoring by a named insured. The policy also shall protect against Automobile Non-Ownership Liability in connection with the Contractor's operations under the Contract, whether such operations be by itself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

SC-6.05 Add the following new subparagraph after subparagraph 6.05.A.1:

6.05.A.1.a In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:

1) Tighe & Bond (53 Southampton Rd, Westfield, MA 01085)

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

SC-7.01 Add the following new paragraph immediately after paragraph 7.02B.

7.02C 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.

SC-7.06 Add the following language at the end of paragraph 7.06O.2:

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

SC-7.06 Add the following language at the end of Paragraph 7.06L:

except as required otherwise by Massachusetts General Law Chapter 149, Section 44F.

SC-7.07 Delete paragraph 7.07B in its entirety.

SC-7.08 Delete the word "Owner" in the last sentence of Paragraph 7.08A and replace with the word "Contractor."

SC-7.09 Add the following sentence at the end of paragraph 7.09.A.

All materials provided under this Contract are exempt from the Sales and Use Taxes of the Commonwealth of Massachusetts. The tax exemption number will be provided to the Contractor.

SC-7.10 Add the following new paragraph immediately after paragraph 7.10C.

7.10D Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records.

SC-7.18 Add the following new paragraph immediately after paragraph 7.18.C.

7.18D If, through 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 on account of any such damage alleged to have been sustained, Owner shall notify Contractor, who shall indemnify, defend, and save harmless Owner against any such claim.

ARTICLE 8 - OTHER WORK AT THE SITE

No Modifications

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

B. On this Project, by agreement with the Owner, Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.

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

SC-11.06 Insert the following sentence at the end of Paragraph 11.06.A.2:

If Engineer does not take action on the Change Proposal and neither Owner nor Contractor submit a letter to the other party indicating that the Change Proposal is deemed denied, then the Change Proposal shall be deemed denied after 60 days of Engineer's receipt of the Contractor's supporting data, thereby commencing the time for appeal of the denial under Article 12.

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

SC-13.01 Delete the word "superintendents" in the second sentence after the word "limitation."

SC-13.01 Delete paragraph 13.01B.5.c in its entirety and replace with the following:

13.01B.5.c The fair rental and operating cost of all machinery and equipment used on the extra work for the period of such use. The fair rental and operating cost for all machinery and equipment shall be based upon the most recent edition of "Rental Rate Bluebook for Construction Equipment" (the "Bluebook"), published by Equipment Watch (equipmentwatch.com), or a similar publication approved by Engineer and adjusted for regional and age adjustments as specified in the "Bluebook." Rental periods corresponding to the overall period of use shall be used, except if a piece of equipment used on extra work is already on the job, or has previously been rented for a long period of time (months), then the long-term rental rate (monthly) shall be used in determining costs. The hourly rental rate for long-term rental equipment will be determined by the monthly rental rate divided by 176.

For the situation where equipment is on the job and available for use but cannot be used due to a delay or suspension of a portion or all of the Contract activities, a rental standby rate may be paid if the Contractor can conclusively demonstrate to the satisfaction of the Engineer that: (1) the equipment cannot be used elsewhere on the Project or demobilized and remobilized at a cost lower than the cost of standby time, (2) that the equipment cannot be put in use due to factors beyond the Contractor's control, and (3) the equipment on standby would have been used as part of the Work that is suspended or put on hold. The standby rate will be calculated as no more than 50% of the rental rate as listed in the "Bluebook" and adjusted for regional and age adjustments. Lesser standby rates may apply if the Owner or Engineer can demonstrate that the Contractor's standby cost is less than this rate. The standby rate will not include operating costs. A standby rate will not be paid for equipment which is being employed for portions of the Work which are still underway. A standby rate will also not be paid for equipment which is readily demobilized including construction equipment categorized as "shop tools" or "miscellaneous" in the "Bluebook." Standby rates for durations of less than four hours will not be considered.

SC-13.01 Insert in the first sentence after the word "architects" the word "superintendents."

SC-13.01 Add the following new paragraph immediately after paragraph 13.01C.5:

13.01C.6 Costs of or rental of small tools; costs of or rental of buildings.

SC-13.03 Delete the word "and" in Paragraph 13.03E.1 and replace with the word "or."

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

SC-14.02 Insert after the word "notice" the words "(minimum 24 hours)" in paragraph 14.02A.

SC-14.03 Delete paragraph 14.03B in its entirety and replace with the following:

14.03B *Engineer's Authority:* At any time during the progress of the Work, Engineer shall have the authority to determine whether Work is defective, and reject defective Work, even though such work has been previously inspected and paid for.

SC-14.06 Add the following new paragraph immediately after paragraph 14.06A.

14.06B If Owner stops work under Paragraph 14.06, Contractor shall not be entitled to an extension of Contract Time nor to an increase in Contract Price.

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

SC-15.01 Insert the following sentence at the end of paragraph 15.01B.1:

The Certificate of Insurance for stored materials must list Tighe & Bond and the Town of Westwood Sewer Commission as additional insureds.

SC-15.01 Delete paragraph 15.01C.1 in its entirety and insert the following in its place:

15.01C.1 Progress Payments will be made in accordance with Massachusetts General Law Chapter 30, Section 39G, which is referenced in Part II of these Supplementary Conditions.

SC-15.01 Delete paragraph 15.01D.1 in its entirety and insert the following in its place:

15.01D.1 Thirty 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.

SC-15.03 Delete the second sentence in Paragraph 15.03A in its entirety.

SC-15.03 Delete paragraph 15.03C in its entirety and insert the following in its place:

15.03C If, after consultation with Owner, Engineer considers and the Owner agrees that the Work is substantially complete, Engineer will prepare and deliver to Contractor, in a form approved by Owner, a Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be included with the certificate a list of items to be completed or corrected before final payment.

SC-15.03 Delete the word "preliminary" from paragraph 15.03D.

SC-15.04 Add the following new paragraph immediately after paragraph 15.04A.3:

15.04A.4 Owner may at any time request Contractor in writing to permit Owner to take over operation of any part of the Work although it is not substantially complete. A copy of such request will be sent to Engineer, and within a reasonable time thereafter Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

Paragraph 15.04.A.4 shall be renumbered to 15.04.A.5

SC-15.06 Delete paragraph 15.06.D in its entirety and insert the following in its place:

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, or other time period in accordance with applicable laws and regulations, 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.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

SC-16.01 Delete paragraph 16.01.A in its entirety and insert the following in its place:

16.01.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 referenced in Part II of the Supplementary Conditions.

SC- 16.02 Add the following new paragraph immediately after paragraph 16.02.A.4:

16.02.A.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
No Modifications

ARTICLE 18 - MISCELLANEOUS

SC-18.08 Add the following new paragraphs immediately after paragraph 18.08.

18.09 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. Copies of the wage schedules are included in Part II of these Supplementary Conditions. If 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 administrating 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.

B. The schedules 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 in regard to the payment of wages in excess of those specified in the schedules shall be resolved by Contractor.

C. Per MGL Chapter 149, Section 27, Contractor shall comply with annual updates to the prevailing wage schedule which shall be effective on the anniversary date of the execution of the Contract.

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

PART II – FEDERAL AND STATE GOVERNMENT PROVISIONS

Federal and State Government Provisions referenced or 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 3.01.B.1 of the Supplementary Conditions.

2.0 COMMONWEALTH OF MASSACHUSETTS PROVISIONS

2.1 The 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.

2.2 Massachusetts General Laws

2.3.1 Chapter 30, Section 39F

2.3.2 Chapter 30, Section 39G

2.3.3 Chapter 30, Section 39I

2.3.4 Chapter 30, Section 39J

2.3.5 Chapter 30, Section 39K

2.3.6 Chapter 30, Section 39L

2.3.7 Chapter 30, Section 39M

2.3.8 Chapter 30, Section 39N

2.3.9 Chapter 30, Section 39O

2.3.10 Chapter 30, Section39P

2.3.11 Chapter 30, Section 39Q

2.3.12 Chapter 30, Section 39R

2.3.13 Chapter 44, Section 31C

2.3.14 Chapter 82, Section 40

2.3.15 Chapter 149, Section 34

2.3.16 Chapter 149, Section 44F

2.3.17 Chapter 149, Section 44G

2.3.18 Chapter 149, Section 44J

2.4 520 CMR 14.00 Excavation Trench Safety

2.5 State Wage Rates

2.6 MCP

END OF SECTION

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ATTACHMENTS TO SUPPLEMENTARY CONDITIONS

ATTACHMENT A
MASSACHUSETTS STATE WAGE RATES

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

Prevailing Wage Rates

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

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

RONALD L. WALKER, II
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: Town of Westwood

Contract Number: DPW-17-C-011 **City/Town:** WESTWOOD

Description of Work: Westwood Pump Station Works

Job Location: 50 Carby Street Westwood MA 02090

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.25	$10.91	$10.08	$0.00	$54.24
	12/01/2016	$33.25	$10.91	$10.89	$0.00	$55.05
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.32	$10.91	$10.08	$0.00	$54.31
	12/01/2016	$33.32	$10.91	$10.89	$0.00	$55.12
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.44	$10.91	$10.08	$0.00	$54.43
	12/01/2016	$33.44	$10.91	$10.89	$0.00	$55.24
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$88.29	$9.80	$19.23	$0.00	$117.32
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2015	$34.38	$10.40	$5.95	$0.00	$50.73
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2016	$41.62	$6.97	$16.21	$0.00	$64.80
	01/01/2017	$42.92	$6.97	$16.21	$0.00	$66.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.05	$6.97	$10.54	$0.00	$44.56
2	65	$27.05	$6.97	$10.54	$0.00	$44.56
3	70	$29.13	$6.97	$11.35	$0.00	$47.45
4	75	$31.22	$6.97	$12.16	$0.00	$50.35
5	80	$33.30	$6.97	$12.97	$0.00	$53.24
6	85	$35.38	$6.97	$13.78	$0.00	$56.13
7	90	$37.46	$6.97	$14.59	$0.00	$59.02
8	95	$39.54	$6.97	$15.40	$0.00	$61.91

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.90	$6.97	$10.54	$0.00	$45.41
2	65	$27.90	$6.97	$10.54	$0.00	$45.41
3	70	$30.04	$6.97	$11.35	$0.00	$48.36
4	75	$32.19	$6.97	$12.16	$0.00	$51.32
5	80	$34.34	$6.97	$12.97	$0.00	$54.28
6	85	$36.48	$6.97	$13.78	$0.00	$57.23
7	90	$38.63	$6.97	$14.59	$0.00	$60.19
8	95	$40.77	$6.97	$15.40	$0.00	$63.14

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	09/01/2016	$48.66	$10.18	$18.62	$0.00	$77.46
BRICKLAYERS LOCAL 3 (FOXBORO)	03/01/2017	$49.23	$10.18	$18.62	$0.00	$78.03

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.33	$10.18	$18.62	$0.00	$53.13
2	60	$29.20	$10.18	$18.62	$0.00	$58.00
3	70	$34.06	$10.18	$18.62	$0.00	$62.86
4	80	$38.93	$10.18	$18.62	$0.00	$67.73
5	90	$43.79	$10.18	$18.62	$0.00	$72.59

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.62	$10.18	$18.62	$0.00	$53.42
2	60	$29.54	$10.18	$18.62	$0.00	$58.34
3	70	$34.46	$10.18	$18.62	$0.00	$63.26
4	80	$39.38	$10.18	$18.62	$0.00	$68.18
5	90	$44.31	$10.18	$18.62	$0.00	$73.11

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$36.95	$7.45	$14.00	$0.00	$58.40
	12/01/2016	$37.95	$7.45	$14.00	$0.00	$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2016	$38.08	$9.80	$16.82	$0.00	$64.70
	03/01/2017	$39.05	$9.80	$16.82	$0.00	$65.67
	09/01/2017	$40.06	$9.80	$16.82	$0.00	$66.68
	03/01/2018	$41.06	$9.80	$16.82	$0.00	$67.68
	09/01/2018	$42.10	$9.80	$16.82	$0.00	$68.72
	03/01/2019	$43.13	$9.80	$16.82	$0.00	$69.75

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.04	$9.80	$1.63	$0.00	$30.47
2	60	$22.85	$9.80	$1.63	$0.00	$34.28
3	70	$26.66	$9.80	$11.93	$0.00	$48.39
4	75	$28.56	$9.80	$11.93	$0.00	$50.29
5	80	$30.46	$9.80	$13.56	$0.00	$53.82
6	80	$30.46	$9.80	$13.56	$0.00	$53.82
7	90	$34.27	$9.80	$15.19	$0.00	$59.26
8	90	$34.27	$9.80	$15.19	$0.00	$59.26

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.53	$9.80	$1.63	$0.00	$30.96
2	60	$23.43	$9.80	$1.63	$0.00	$34.86
3	70	$27.34	$9.80	$11.93	$0.00	$49.07
4	75	$29.29	$9.80	$11.93	$0.00	$51.02
5	80	$31.24	$9.80	$13.56	$0.00	$54.60
6	80	$31.24	$9.80	$13.56	$0.00	$54.60
7	90	$35.15	$9.80	$15.19	$0.00	$60.14
8	90	$35.15	$9.80	$15.19	$0.00	$60.14

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (FOXBORO)*	01/01/2016	$41.51	$10.90	$18.71	$1.30	$72.42

Apprentice - *CEMENT MASONRY/PLASTERING - Foxboro*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.76	$10.90	$12.21	$0.00	$43.87
2	60	$24.91	$10.90	$13.71	$1.30	$50.82
3	65	$26.98	$10.90	$14.71	$1.30	$53.89
4	70	$29.06	$10.90	$15.71	$1.30	$56.97
5	75	$31.13	$10.90	$16.71	$1.30	$60.04
6	80	$33.21	$10.90	$17.71	$1.30	$63.12
7	90	$37.36	$10.90	$18.71	$1.30	$68.27

Notes:

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$45.23	$10.00	$15.15	$0.00	$70.38
	12/01/2016	$46.48	$10.00	$15.15	$0.00	$71.63
	06/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
	12/01/2017	$48.48	$10.00	$15.15	$0.00	$73.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.71	$7.85	$0.00	$0.00	$33.56
2	55	$28.28	$7.85	$3.66	$0.00	$39.79
3	60	$30.85	$7.85	$3.99	$0.00	$42.69
4	65	$33.42	$7.85	$4.32	$0.00	$45.59
5	70	$35.99	$7.85	$14.11	$0.00	$57.95
6	75	$38.56	$7.85	$14.44	$0.00	$60.85
7	80	$41.13	$7.85	$14.77	$0.00	$63.75
8	90	$46.27	$7.85	$15.44	$0.00	$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
DEMO: BURNERS *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
DEMO: WRECKING LABORER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$58.86	$9.80	$19.23	$0.00	$87.89
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$63.06	$9.80	$19.23	$0.00	$92.09
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$88.23	$9.80	$19.23	$0.00	$117.26
DRAWBRIDGE OPERATOR (Construction) *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.47	$13.00	$0.55	$0.00	$32.02
2	40	$18.47	$13.00	$0.55	$0.00	$32.02
3	45	$20.78	$13.00	$12.34	$0.00	$46.12
4	45	$20.78	$13.00	$12.34	$0.00	$46.12
5	50	$23.09	$13.00	$12.71	$0.00	$48.80
6	55	$25.39	$13.00	$13.07	$0.00	$51.46
7	60	$27.70	$13.00	$13.44	$0.00	$54.14
8	65	$30.01	$13.00	$13.81	$0.00	$56.82
9	70	$32.32	$13.00	$14.18	$0.00	$59.50
10	75	$34.63	$13.00	$14.55	$0.00	$62.18

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

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2016	$54.53	$14.43	$14.96	$0.00	$83.92
	01/01/2017	$55.86	$15.28	$15.71	$0.00	$86.85

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.27	$14.43	$0.00	$0.00	$41.70
2	55	$29.99	$14.43	$14.96	$0.00	$59.38
3	65	$35.44	$14.43	$14.96	$0.00	$64.83
4	70	$38.17	$14.43	$14.96	$0.00	$67.56
5	80	$43.62	$14.43	$14.96	$0.00	$73.01

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.93	$15.28	$0.00	$0.00	$43.21
2	55	$30.72	$15.28	$15.71	$0.00	$61.71
3	65	$36.31	$15.28	$15.71	$0.00	$67.30
4	70	$39.10	$15.28	$15.71	$0.00	$70.09
5	80	$44.69	$15.28	$15.71	$0.00	$75.68

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2016	$38.17	$14.43	$14.96	$0.00	$67.56
	01/01/2017	$39.10	$15.28	$15.71	$0.00	$70.09

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2016	$41.03	$10.00	$14.90	$0.00	$65.93
	11/01/2016	$41.62	$10.00	$14.90	$0.00	$66.52
	05/01/2017	$42.50	$10.00	$14.90	$0.00	$67.40
	11/01/2017	$43.23	$10.00	$14.90	$0.00	$68.13
	05/01/2018	$43.94	$10.00	$14.90	$0.00	$68.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2016	$42.47	$10.00	$14.90	$0.00	$67.37
	11/01/2016	$43.07	$10.00	$14.90	$0.00	$67.97
	05/01/2017	$43.96	$10.00	$14.90	$0.00	$68.86
	11/01/2017	$44.69	$10.00	$14.90	$0.00	$69.59
	05/01/2018	$45.41	$10.00	$14.90	$0.00	$70.31
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2016	$21.88	$10.00	$14.90	$0.00	$46.78
	11/01/2016	$22.23	$10.00	$14.90	$0.00	$47.13
	05/01/2017	$22.76	$10.00	$14.90	$0.00	$47.66
	11/01/2017	$23.18	$10.00	$14.90	$0.00	$48.08
	05/01/2018	$23.61	$10.00	$14.90	$0.00	$48.51
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103*	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$36.71	$10.00	$15.15	$0.00	$61.86
	12/01/2016	$37.75	$10.00	$15.15	$0.00	$62.90
	06/01/2017	$38.59	$10.00	$15.15	$0.00	$63.74
	12/01/2017	$39.42	$10.00	$15.15	$0.00	$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 2*	06/01/2016	$20.50	$7.45	$12.65	$0.00	$40.60
	12/01/2016	$20.50	$7.45	$12.65	$0.00	$40.60
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2016	$42.13	$9.80	$17.62	$0.00	$69.55

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.07	$9.80	$1.79	$0.00	$32.66
2	55	$23.17	$9.80	$1.79	$0.00	$34.76
3	60	$25.28	$9.80	$12.25	$0.00	$47.33
4	65	$27.38	$9.80	$12.25	$0.00	$49.43
5	70	$29.49	$9.80	$14.04	$0.00	$53.33
6	75	$31.60	$9.80	$14.04	$0.00	$55.44
7	80	$33.70	$9.80	$15.83	$0.00	$59.33
8	85	$35.81	$9.80	$15.83	$0.00	$61.44

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 1)*	07/01/2016	$45.75	$7.85	$16.10	$0.00	$69.70
	01/01/2017	$46.70	$7.85	$16.10	$0.00	$70.65

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 1*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$7.85	$0.00	$0.00	$30.73
2	55	$25.16	$7.85	$3.66	$0.00	$36.67
3	60	$27.45	$7.85	$3.99	$0.00	$39.29
4	65	$29.74	$7.85	$4.32	$0.00	$41.91
5	70	$32.03	$7.85	$14.11	$0.00	$53.99
6	75	$34.31	$7.85	$14.44	$0.00	$56.60
7	80	$36.60	$7.85	$14.77	$0.00	$59.22
8	90	$41.18	$7.85	$15.44	$0.00	$64.47

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.35	$7.85	$0.00	$0.00	$31.20
2	55	$25.69	$7.85	$3.66	$0.00	$37.20
3	60	$28.02	$7.85	$3.99	$0.00	$39.86
4	65	$30.36	$7.85	$4.32	$0.00	$42.53
5	70	$32.69	$7.85	$14.11	$0.00	$54.65
6	75	$35.03	$7.85	$14.44	$0.00	$57.32
7	80	$37.36	$7.85	$14.77	$0.00	$59.98
8	90	$42.03	$7.85	$15.44	$0.00	$65.32

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$24.33	$10.00	$0.00	$0.00	$34.33
2	60	$26.54	$10.00	$15.15	$0.00	$51.69
3	65	$28.75	$10.00	$15.15	$0.00	$53.90
4	70	$30.96	$10.00	$15.15	$0.00	$56.11
5	75	$33.17	$10.00	$15.15	$0.00	$58.32
6	80	$35.38	$10.00	$15.15	$0.00	$60.53
7	85	$37.60	$10.00	$15.15	$0.00	$62.75
8	90	$39.81	$10.00	$15.15	$0.00	$64.96

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$25.01	$10.00	$0.00	$0.00	$35.01
2	60	$27.29	$10.00	$15.15	$0.00	$52.44
3	65	$29.56	$10.00	$15.15	$0.00	$54.71
4	70	$31.84	$10.00	$15.15	$0.00	$56.99
5	75	$34.11	$10.00	$15.15	$0.00	$59.26
6	80	$36.38	$10.00	$15.15	$0.00	$61.53
7	85	$38.66	$10.00	$15.15	$0.00	$63.81
8	90	$40.93	$10.00	$15.15	$0.00	$66.08

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2016	$43.31	$10.70	$23.07	$2.31	$79.39
	02/01/2017	$44.41	$10.70	$23.07	$2.31	$80.49
	08/01/2017	$45.51	$10.70	$23.07	$2.31	$81.59
	02/01/2018	$46.66	$10.70	$23.07	$2.31	$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2016	$43.31	$10.70	$23.07	$2.31	$79.39
	02/01/2017	$44.41	$10.70	$23.07	$2.31	$80.49
	08/01/2017	$45.51	$10.70	$23.07	$2.31	$81.59
	02/01/2018	$46.66	$10.70	$23.07	$2.31	$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2016	$45.81	$11.50	$13.80	$0.00	$71.11
	09/01/2017	$47.81	$11.50	$13.80	$0.00	$73.11
	09/01/2018	$50.06	$11.50	$13.80	$0.00	$75.36
	09/01/2019	$52.56	$11.50	$13.80	$0.00	$77.86

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.91	$11.50	$10.05	$0.00	$44.46
2	60	$27.49	$11.50	$10.80	$0.00	$49.79
3	70	$32.07	$11.50	$11.55	$0.00	$55.12
4	80	$36.65	$11.50	$12.30	$0.00	$60.45

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.91	$11.50	$10.05	$0.00	$45.46
2	60	$28.69	$11.50	$10.80	$0.00	$50.99
3	70	$33.47	$11.50	$11.55	$0.00	$56.52
4	80	$38.25	$11.50	$12.30	$0.00	$62.05

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2016	$43.40	$7.80	$20.85	$0.00	$72.05
	09/16/2016	$44.05	$7.80	$20.85	$0.00	$72.70
	03/16/2017	$44.65	$7.80	$20.85	$0.00	$73.30

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.04	$7.80	$20.85	$0.00	$54.69
2	70	$30.38	$7.80	$20.85	$0.00	$59.03
3	75	$32.55	$7.80	$20.85	$0.00	$61.20
4	80	$34.72	$7.80	$20.85	$0.00	$63.37
5	85	$36.89	$7.80	$20.85	$0.00	$65.54
6	90	$39.06	$7.80	$20.85	$0.00	$67.71

Effective Date - 09/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.43	$7.80	$20.85	$0.00	$55.08
2	70	$30.84	$7.80	$20.85	$0.00	$59.49
3	75	$33.04	$7.80	$20.85	$0.00	$61.69
4	80	$35.24	$7.80	$20.85	$0.00	$63.89
5	85	$37.44	$7.80	$20.85	$0.00	$66.09
6	90	$39.65	$7.80	$20.85	$0.00	$68.30

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.99	$7.45	$12.65	$0.00	$39.09
2	70	$22.16	$7.45	$12.65	$0.00	$42.26
3	80	$25.32	$7.45	$12.65	$0.00	$45.42
4	90	$28.49	$7.45	$12.65	$0.00	$48.59

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$19.44	$7.45	$12.65	$0.00	$39.54
2	70	$22.68	$7.45	$12.65	$0.00	$42.78
3	80	$25.92	$7.45	$12.65	$0.00	$46.02
4	90	$29.16	$7.45	$12.65	$0.00	$49.26

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2015	$31.35	$7.45	$12.60	$0.00	$51.40
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$38.78	$10.18	$17.78	$0.00	$66.74
	02/01/2017	$39.24	$10.18	$17.78	$0.00	$67.20

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.39	$10.18	$17.78	$0.00	$47.35
2	60	$23.27	$10.18	$17.78	$0.00	$51.23
3	70	$27.15	$10.18	$17.78	$0.00	$55.11
4	80	$31.02	$10.18	$17.78	$0.00	$58.98
5	90	$34.90	$10.18	$17.78	$0.00	$62.86

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.62	$10.18	$17.78	$0.00	$47.58
2	60	$23.54	$10.18	$17.78	$0.00	$51.50
3	70	$27.47	$10.18	$17.78	$0.00	$55.43
4	80	$31.39	$10.18	$17.78	$0.00	$59.35
5	90	$35.32	$10.18	$17.78	$0.00	$63.28

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$50.80	$10.18	$19.22	$0.00	$80.20
	02/01/2017	$51.37	$10.18	$19.22	$0.00	$80.77

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.40	$10.18	$19.22	$0.00	$54.80
2	60	$30.48	$10.18	$19.22	$0.00	$59.88
3	70	$35.56	$10.18	$19.22	$0.00	$64.96
4	80	$40.64	$10.18	$19.22	$0.00	$70.04
5	90	$45.72	$10.18	$19.22	$0.00	$75.12

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.69	$10.18	$19.22	$0.00	$55.09
2	60	$30.82	$10.18	$19.22	$0.00	$60.22
3	70	$35.96	$10.18	$19.22	$0.00	$65.36
4	80	$41.10	$10.18	$19.22	$0.00	$70.50
5	90	$46.23	$10.18	$19.22	$0.00	$75.63

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	04/01/2015	$37.64	$9.80	$16.21	$0.00	$63.65

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$20.70	$9.80	$4.48	$0.00	$34.98
2	65	$24.47	$9.80	$13.36	$0.00	$47.63
3	75	$28.23	$9.80	$14.18	$0.00	$52.21
4	85	$31.99	$9.80	$14.99	$0.00	$56.78

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$22.41	$10.00	$15.15	$0.00	$47.56
	12/01/2016	$23.06	$10.00	$15.15	$0.00	$48.21
	06/01/2017	$23.57	$10.00	$15.15	$0.00	$48.72
	12/01/2017	$24.09	$10.00	$15.15	$0.00	$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$26.29	$10.00	$15.15	$0.00	$51.44
	12/01/2016	$27.04	$10.00	$15.15	$0.00	$52.19
	06/01/2017	$27.64	$10.00	$15.15	$0.00	$52.79
	12/01/2017	$28.25	$10.00	$15.15	$0.00	$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.71	$7.85	$0.00	$0.00	$33.56
2	55	$28.28	$7.85	$3.66	$0.00	$39.79
3	60	$30.85	$7.85	$3.99	$0.00	$42.69
4	65	$33.42	$7.85	$4.32	$0.00	$45.59
5	70	$35.99	$7.85	$14.11	$0.00	$57.95
6	75	$38.56	$7.85	$14.44	$0.00	$60.85
7	80	$41.13	$7.85	$14.77	$0.00	$63.75
8	90	$46.27	$7.85	$15.44	$0.00	$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2016	$47.15	$7.85	$16.10	$0.00	$71.10
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 1*	01/01/2017	$48.10	$7.85	$16.10	$0.00	$72.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - New*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.58	$7.85	$0.00	$0.00	$31.43
2	55	$25.93	$7.85	$3.66	$0.00	$37.44
3	60	$28.29	$7.85	$3.99	$0.00	$40.13
4	65	$30.65	$7.85	$4.32	$0.00	$42.82
5	70	$33.01	$7.85	$14.11	$0.00	$54.97
6	75	$35.36	$7.85	$14.44	$0.00	$57.65
7	80	$37.72	$7.85	$14.77	$0.00	$60.34
8	90	$42.44	$7.85	$15.44	$0.00	$65.73

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.05	$7.85	$0.00	$0.00	$31.90
2	55	$26.46	$7.85	$3.66	$0.00	$37.97
3	60	$28.86	$7.85	$3.99	$0.00	$40.70
4	65	$31.27	$7.85	$4.32	$0.00	$43.44
5	70	$33.67	$7.85	$14.11	$0.00	$55.63
6	75	$36.08	$7.85	$14.44	$0.00	$58.37
7	80	$38.48	$7.85	$14.77	$0.00	$61.10
8	90	$43.29	$7.85	$15.44	$0.00	$66.58

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2016	$45.21	$7.85	$16.10	$0.00	$69.16
	01/01/2017	$46.16	$7.85	$16.10	$0.00	$70.11

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.61	$7.85	$0.00	$0.00	$30.46
2	55	$24.87	$7.85	$3.66	$0.00	$36.38
3	60	$27.13	$7.85	$3.99	$0.00	$38.97
4	65	$29.39	$7.85	$4.32	$0.00	$41.56
5	70	$31.65	$7.85	$14.11	$0.00	$53.61
6	75	$33.91	$7.85	$14.44	$0.00	$56.20
7	80	$36.17	$7.85	$14.77	$0.00	$58.79
8	90	$40.69	$7.85	$15.44	$0.00	$63.98

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.08	$7.85	$0.00	$0.00	$30.93
2	55	$25.39	$7.85	$3.66	$0.00	$36.90
3	60	$27.70	$7.85	$3.99	$0.00	$39.54
4	65	$30.00	$7.85	$4.32	$0.00	$42.17
5	70	$32.31	$7.85	$14.11	$0.00	$54.27
6	75	$34.62	$7.85	$14.44	$0.00	$56.91
7	80	$36.93	$7.85	$14.77	$0.00	$59.55
8	90	$41.54	$7.85	$15.44	$0.00	$64.83

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 2* For Apprentice rates see "Apprentice- LABORER"	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
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 1*	07/01/2016	$45.75	$7.85	$16.10	$0.00	$69.70
	01/01/2017	$46.70	$7.85	$16.10	$0.00	$70.65

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 1 - BRUSH NEW*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.88	$7.85	$0.00	$0.00	$30.73
2	55	$25.16	$7.85	$3.66	$0.00	$36.67
3	60	$27.45	$7.85	$3.99	$0.00	$39.29
4	65	$29.74	$7.85	$4.32	$0.00	$41.91
5	70	$32.03	$7.85	$14.11	$0.00	$53.99
6	75	$34.31	$7.85	$14.44	$0.00	$56.60
7	80	$36.60	$7.85	$14.77	$0.00	$59.22
8	90	$41.18	$7.85	$15.44	$0.00	$64.47

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.35	$7.85	$0.00	$0.00	$31.20
2	55	$25.69	$7.85	$3.66	$0.00	$37.20
3	60	$28.02	$7.85	$3.99	$0.00	$39.86
4	65	$30.36	$7.85	$4.32	$0.00	$42.53
5	70	$32.69	$7.85	$14.11	$0.00	$54.65
6	75	$35.03	$7.85	$14.44	$0.00	$57.32
7	80	$37.36	$7.85	$14.77	$0.00	$59.98
8	90	$42.03	$7.85	$15.44	$0.00	$65.32

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2016	$43.81	$7.85	$16.10	$0.00	$67.76
	01/01/2017	$44.76	$7.85	$16.10	$0.00	$68.71

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - BRUSH REPAINT*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.91	$7.85	$0.00	$0.00	$29.76
2	55	$24.10	$7.85	$3.66	$0.00	$35.61
3	60	$26.29	$7.85	$3.99	$0.00	$38.13
4	65	$28.48	$7.85	$4.32	$0.00	$40.65
5	70	$30.67	$7.85	$14.11	$0.00	$52.63
6	75	$32.86	$7.85	$14.44	$0.00	$55.15
7	80	$35.05	$7.85	$14.77	$0.00	$57.67
8	90	$39.43	$7.85	$15.44	$0.00	$62.72

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.38	$7.85	$0.00	$0.00	$30.23
2	55	$24.62	$7.85	$3.66	$0.00	$36.13
3	60	$26.86	$7.85	$3.99	$0.00	$38.70
4	65	$29.09	$7.85	$4.32	$0.00	$41.26
5	70	$31.33	$7.85	$14.11	$0.00	$53.29
6	75	$33.57	$7.85	$14.44	$0.00	$55.86
7	80	$35.81	$7.85	$14.77	$0.00	$58.43
8	90	$40.28	$7.85	$15.44	$0.00	$63.57

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.08	$10.91	$10.08	$0.00	$54.07
	12/01/2016	$33.08	$10.91	$10.89	$0.00	$54.88
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.02	$9.80	$19.23	$0.00	$50.05
2	60	$25.22	$9.80	$19.23	$0.00	$54.25
3	70	$29.43	$9.80	$19.23	$0.00	$58.46
4	75	$31.53	$9.80	$19.23	$0.00	$60.56
5	80	$33.63	$9.80	$19.23	$0.00	$62.66
6	80	$33.63	$9.80	$19.23	$0.00	$62.66
7	90	$37.84	$9.80	$19.23	$0.00	$66.87
8	90	$37.84	$9.80	$19.23	$0.00	$66.87

Notes:

Apprentice to Journeyworker Ratio:1:3

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.08	$9.70	$7.50	$0.00	$37.28
2	45	$22.59	$9.70	$18.14	$0.00	$50.43
3	60	$30.11	$9.70	$18.14	$0.00	$57.95
4	70	$35.13	$9.70	$18.14	$0.00	$62.97
5	80	$40.15	$9.70	$18.14	$0.00	$67.99

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.48	$9.70	$7.50	$0.00	$37.68
2	45	$23.04	$9.70	$18.14	$0.00	$50.88
3	60	$30.71	$9.70	$18.14	$0.00	$58.55
4	70	$35.83	$9.70	$18.14	$0.00	$63.67
5	80	$40.95	$9.70	$18.14	$0.00	$68.79

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2016	$51.69	$11.32	$15.46	$0.00	$78.47
	03/01/2017	$52.69	$11.32	$15.46	$0.00	$79.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.09	$11.32	$5.74	$0.00	$35.15
2	40	$20.68	$11.32	$6.49	$0.00	$38.49
3	55	$28.43	$11.32	$8.73	$0.00	$48.48
4	65	$33.60	$11.32	$10.23	$0.00	$55.15
5	75	$38.77	$11.32	$11.72	$0.00	$61.81

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.44	$11.32	$5.74	$0.00	$35.50
2	40	$21.08	$11.32	$6.49	$0.00	$38.89
3	55	$28.98	$11.32	$8.73	$0.00	$49.03
4	65	$34.25	$11.32	$10.23	$0.00	$55.80
5	75	$39.52	$11.32	$11.72	$0.00	$62.56

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$58.50 Step5 with lic$65.36

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
	12/01/2016	$33.40	$7.45	$12.65	$0.00	$53.50
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY MIX CONCRETE DRIVERS after 4/30/10 (Drivers Hired After 4/30/2010) *TEAMSTERS LOCAL 25b*	07/01/2016	$28.03	$8.23	$9.31	$0.00	$45.57
	05/01/2017	$28.18	$8.23	$9.72	$0.00	$46.13
	07/01/2017	$28.18	$8.48	$9.72	$0.00	$46.38
READY-MIX CONCRETE DRIVER *TEAMSTERS LOCAL 25b*	07/01/2016	$29.33	$8.23	$9.31	$0.00	$46.87
	05/01/2017	$29.48	$8.23	$9.72	$0.00	$47.43
	07/01/2017	$29.48	$8.48	$9.72	$0.00	$47.68
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work) *CARPENTERS -ZONE 2 (Residential Wood)*	04/01/2015	$25.25	$9.80	$16.82	$0.00	$51.87
RESIDENTIAL WOOD FRAME CARPENTER ** ** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. *CARPENTERS -ZONE 2 (Residential Wood)*	04/01/2015	$25.30	$7.00	$6.31	$0.00	$38.61

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Apprentice - *CARPENTER (Residential Wood Frame) - Zone 2*

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.18	$7.00	$0.00	$0.00	$22.18
2	60	$15.18	$7.00	$0.00	$0.00	$22.18
3	65	$16.45	$7.00	$6.31	$0.00	$29.76
4	70	$17.71	$7.00	$6.31	$0.00	$31.02
5	75	$18.98	$7.00	$6.31	$0.00	$32.29
6	80	$20.24	$7.00	$6.31	$0.00	$33.55
7	85	$21.51	$7.00	$6.31	$0.00	$34.82
8	90	$22.77	$7.00	$6.31	$0.00	$36.08

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2016	$41.11	$11.00	$13.00	$0.00	$65.11
	02/01/2017	$42.26	$11.00	$13.00	$0.00	$66.26
	08/01/2017	$43.36	$11.00	$13.00	$0.00	$67.36
	02/01/2018	$44.51	$11.00	$13.00	$0.00	$68.51
	08/01/2018	$45.61	$11.00	$13.00	$0.00	$69.61
	02/01/2019	$46.76	$11.00	$13.00	$0.00	$70.76

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.56	$11.00	$3.44	$0.00	$35.00
2	60	$24.67	$11.00	$13.00	$0.00	$48.67
3	65	$26.72	$11.00	$13.00	$0.00	$50.72
4	75	$30.83	$11.00	$13.00	$0.00	$54.83
5	85	$34.94	$11.00	$13.00	$0.00	$58.94

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.13	$11.00	$3.44	$0.00	$35.57
2	60	$25.36	$11.00	$13.00	$0.00	$49.36
3	65	$27.47	$11.00	$13.00	$0.00	$51.47
4	75	$31.70	$11.00	$13.00	$0.00	$55.70
5	85	$35.92	$11.00	$13.00	$0.00	$59.92

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.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2016	$41.36	$11.00	$13.00	$0.00	$65.36
	02/01/2017	$42.51	$11.00	$13.00	$0.00	$66.51
	08/01/2017	$43.61	$11.00	$13.00	$0.00	$67.61
	02/01/2018	$44.76	$11.00	$13.00	$0.00	$68.76
	08/01/2018	$45.86	$11.00	$13.00	$0.00	$69.86
	02/01/2019	$47.01	$11.00	$13.00	$0.00	$71.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2016	$43.31	$10.70	$23.07	$2.31	$79.39
	02/01/2017	$44.41	$10.70	$23.07	$2.31	$80.49
	08/01/2017	$45.51	$10.70	$23.07	$2.31	$81.59
	02/01/2018	$46.66	$10.70	$23.07	$2.31	$82.74

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.32	$10.70	$5.24	$0.00	$33.26
2	40	$17.32	$10.70	$5.24	$0.00	$33.26
3	45	$19.49	$10.70	$10.31	$1.21	$41.71
4	45	$19.49	$10.70	$10.31	$1.21	$41.71
5	50	$21.66	$10.70	$11.21	$1.31	$44.88
6	50	$21.66	$10.70	$11.46	$1.31	$45.13
7	60	$25.99	$10.70	$13.02	$1.49	$51.20
8	65	$28.15	$10.70	$13.93	$1.58	$54.36
9	75	$32.48	$10.70	$15.74	$1.77	$60.69
10	85	$36.81	$10.70	$17.05	$1.94	$66.50

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.76	$10.70	$5.24	$0.00	$33.70
2	40	$17.76	$10.70	$5.24	$0.00	$33.70
3	45	$19.98	$10.70	$10.31	$1.23	$42.22
4	45	$19.98	$10.70	$10.31	$1.23	$42.22
5	50	$22.21	$10.70	$11.21	$1.32	$45.44
6	50	$22.21	$10.70	$11.46	$1.33	$45.70
7	60	$26.65	$10.70	$13.02	$1.51	$51.88
8	65	$28.87	$10.70	$13.93	$1.61	$55.11
9	75	$33.31	$10.70	$15.74	$1.79	$61.54
10	85	$37.75	$10.70	$17.05	$1.97	$67.47

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR *PAINTERS LOCAL 35 - ZONE 1*	06/01/2013	$25.81	$7.07	$7.05	$0.00	$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SIGN ERECTOR - Local 35 Zone 1*

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$12.91	$7.07	$0.00	$0.00	$19.98
2	55	$14.20	$7.07	$2.45	$0.00	$23.72
3	60	$15.49	$7.07	$2.45	$0.00	$25.01
4	65	$16.78	$7.07	$2.45	$0.00	$26.30
5	70	$18.07	$7.07	$7.05	$0.00	$32.19
6	75	$19.36	$7.07	$7.05	$0.00	$33.48
7	80	$20.65	$7.07	$7.05	$0.00	$34.77
8	85	$21.94	$7.07	$7.05	$0.00	$36.06
9	90	$23.23	$7.07	$7.05	$0.00	$37.35

Notes:

Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.54	$10.91	$10.08	$0.00	$54.53
	12/01/2016	$33.54	$10.91	$10.89	$0.00	$55.34
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.83	$10.91	$10.08	$0.00	$54.82
	12/01/2016	$33.83	$10.91	$10.89	$0.00	$55.63
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2016	$54.43	$8.67	$16.80	$0.00	$79.90
	10/01/2016	$55.53	$8.67	$16.80	$0.00	$81.00
	03/01/2017	$56.53	$8.67	$16.80	$0.00	$82.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.05	$8.67	$8.55	$0.00	$36.27
2	40	$21.77	$8.67	$8.55	$0.00	$38.99
3	45	$24.49	$8.67	$8.55	$0.00	$41.71
4	50	$27.22	$8.67	$8.55	$0.00	$44.44
5	55	$29.94	$8.67	$8.55	$0.00	$47.16
6	60	$32.66	$8.67	$8.55	$0.00	$49.88
7	65	$35.38	$8.67	$8.55	$0.00	$52.60
8	70	$38.10	$8.67	$8.55	$0.00	$55.32
9	75	$40.82	$8.67	$8.55	$0.00	$58.04
10	80	$43.54	$8.67	$8.55	$0.00	$60.76

Effective Date - 10/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.44	$8.67	$8.55	$0.00	$36.66
2	40	$22.21	$8.67	$8.55	$0.00	$39.43
3	45	$24.99	$8.67	$8.55	$0.00	$42.21
4	50	$27.77	$8.67	$8.55	$0.00	$44.99
5	55	$30.54	$8.67	$8.55	$0.00	$47.76
6	60	$33.32	$8.67	$8.55	$0.00	$50.54
7	65	$36.09	$8.67	$8.55	$0.00	$53.31
8	70	$38.87	$8.67	$8.55	$0.00	$56.09
9	75	$41.65	$8.67	$8.55	$0.00	$58.87
10	80	$44.42	$8.67	$8.55	$0.00	$61.64

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*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.85	$13.00	$0.42	$0.00	$27.27
2	40	$13.85	$13.00	$0.42	$0.00	$27.27
3	45	$15.58	$13.00	$11.52	$0.00	$40.10
4	45	$15.58	$13.00	$11.52	$0.00	$40.10
5	50	$17.32	$13.00	$11.79	$0.00	$42.11
6	55	$19.05	$13.00	$12.06	$0.00	$44.11
7	60	$20.78	$13.00	$12.34	$0.00	$46.12
8	65	$22.51	$13.00	$12.62	$0.00	$48.13
9	70	$24.24	$13.00	$12.90	$0.00	$50.14
10	75	$25.97	$13.00	$13.17	$0.00	$52.14

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$49.70	$10.18	$19.22	$0.00	$79.10
	02/01/2017	$50.27	$10.18	$19.22	$0.00	$79.67

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.85	$10.18	$19.22	$0.00	$54.25
2	60	$29.82	$10.18	$19.22	$0.00	$59.22
3	70	$34.79	$10.18	$19.22	$0.00	$64.19
4	80	$39.76	$10.18	$19.22	$0.00	$69.16
5	90	$44.73	$10.18	$19.22	$0.00	$74.13

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.14	$10.18	$19.22	$0.00	$54.54
2	60	$30.16	$10.18	$19.22	$0.00	$59.56
3	70	$35.19	$10.18	$19.22	$0.00	$64.59
4	80	$40.22	$10.18	$19.22	$0.00	$69.62
5	90	$45.24	$10.18	$19.22	$0.00	$74.64

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$37.20	$7.45	$14.00	$0.00	$58.65
	12/01/2016	$38.20	$7.45	$14.00	$0.00	$59.65

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.92	$7.45	$14.00	$0.00	$57.37
	12/01/2016	$36.92	$7.45	$14.00	$0.00	$58.37
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$34.12	$10.91	$10.08	$0.00	$55.11
	12/01/2016	$34.12	$10.91	$10.89	$0.00	$55.92
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2016	$48.08	$7.45	$14.40	$0.00	$69.93
	12/01/2016	$49.08	$7.45	$14.40	$0.00	$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2016	$50.08	$7.45	$14.40	$0.00	$71.93
	12/01/2016	$51.08	$7.45	$14.40	$0.00	$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2016	$40.15	$7.45	$14.40	$0.00	$62.00
	12/01/2016	$41.15	$7.45	$14.40	$0.00	$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2016	$42.15	$7.45	$14.40	$0.00	$64.00
	12/01/2016	$43.15	$7.45	$14.40	$0.00	$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2016	$33.54	$10.91	$10.08	$0.00	$54.53
	12/01/2016	$33.54	$10.91	$10.89	$0.00	$55.34
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2016	$51.69	$11.32	$15.46	$0.00	$78.47
	03/01/2017	$52.69	$11.32	$15.46	$0.00	$79.47
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$26.61	$7.50	$1.80	$0.00	$35.91
	09/03/2017	$27.14	$7.75	$1.81	$0.00	$36.70
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$37.70	$7.50	$8.87	$0.00	$54.07
	09/03/2017	$38.45	$7.75	$9.53	$0.00	$55.73
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$31.05	$7.50	$8.89	$0.00	$47.44
	09/03/2017	$31.66	$7.75	$9.44	$0.00	$48.85
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$37.70	$7.50	$12.95	$0.00	$58.15
	09/03/2017	$38.45	$7.75	$13.61	$0.00	$59.81
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$33.26	$7.50	$9.63	$0.00	$50.39
	09/03/2017	$33.92	$7.75	$10.21	$0.00	$51.88
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$19.96	$7.50	$1.60	$0.00	$29.06
	09/03/2017	$20.35	$7.75	$1.61	$0.00	$29.71
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$44.35	$7.50	$15.83	$0.00	$67.68
	09/03/2017	$45.23	$7.75	$16.61	$0.00	$69.59

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/28/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.61	$7.50	$3.30	$0.00	$37.41
2	65	$28.83	$7.50	$3.36	$0.00	$39.69
3	70	$31.05	$7.50	$3.43	$0.00	$41.98
4	75	$33.26	$7.50	$5.00	$0.00	$45.76
5	80	$35.48	$7.50	$5.06	$0.00	$48.04
6	85	$37.70	$7.50	$5.13	$0.00	$50.33
7	90	$39.92	$7.50	$7.20	$0.00	$54.62

Effective Date - 09/03/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$27.14	$7.75	$3.31	$0.00	$38.20
2	65	$29.40	$7.75	$3.38	$0.00	$40.53
3	70	$31.66	$7.75	$3.45	$0.00	$42.86
4	75	$33.92	$7.75	$5.02	$0.00	$46.69
5	80	$36.18	$7.75	$5.09	$0.00	$49.02
6	85	$38.45	$7.75	$5.15	$0.00	$51.35
7	90	$40.71	$7.75	$7.22	$0.00	$55.68

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$28.98	$4.25	$3.12	$0.00	$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63
TREE TRIMMER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$18.51	$3.55	$0.00	$0.00	$22.06

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.

TREE TRIMMER GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$16.32	$3.55	$0.00	$0.00	$19.87

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

Massachusetts Department of Revenue

Form ST-2
Certificate of Exemption

Certification is hereby made that the organization herein named is an exempt purchaser under General Laws, Chapter 64H, sections 6(d) and (e). All purchases of tangible personal property by this organization are exempt from taxation under said chapter to the extent that such property is used in the conduct of the business of the purchaser. Any abuse or misuse of this certificate by any tax-exempt organization or any unauthorized use of this certificate by any individual constitutes a serious violation and will lead to revocation. **Willful misuse of this Certificate of Exemption is subject to criminal sanctions of up to one year in prison and $10,000 ($50,000 for corporations) in fines.** (See reverse side.)

TOWN OF WESTWOOD
580 HIGH STREET
WESTWOOD MA 02090

EXEMPTION NUMBER E
046-001-362

ISSUE DATE
01/02/90

CERTIFICATE EXPIRES ON
NONE

NOT ASSIGNABLE OR TRANSFERABLE

COMMISSIONER OF REVENUE
NAVJEET BAL

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Work of the Contract is shown and described in Drawings and Project Manual entitled:

Pump Station Maintenance & Improvements Project
Sewer Commissions
Town of Westwood
November 2016

Tighe & Bond, Inc.
Consulting Engineers
Westwood, Massachusetts

2. The Work includes the following major items:

a. Replacing five sluice gates in the Conant Road Pump Station.

b. New emergency lighting in the Conant Road Pump Station.

c. New internal barrier in the Stevens Farm Road Pump Station electrical panel.

d. Replacing electrical fixtures at the Arcadia Road Pump Station.

e. New of motor control center ventilation at the Arcadia Road Pump Station.

f. Control and power upgrades at the Sycamore Road Pump Station.

g. Replacing five sluice gates at the Brook Street Pump Station.

h. Replacing one pump at the Brook Street Pump Stations.

i. Electrical and controller upgrades at the Brook Street Pump Station

B. Related Requirements

1. Section 00800 - Supplementary Conditions

1.2 SUBMITTALS

A. Informational Submittals

1. Submit copies of permits or approvals required for the Work, prior to initiating the Work.

1.3 EXISTING SYSTEM DESCRIPTION

A. The Conant Road Pump Station was brought into service in 1985. The building is divided into two-halves in a wet well/dry well configuration. The right half of the

building serves as the dry well, with three 25-hp Smith & Loveless flooded-suction vertical centrifugal pumps rated for 600 gpm @ 90' TDH (installed in 2008) downstairs, and electrical components and emergency generator upstairs. The wet well is located in the left-half of the building and is accessible through a second doorway and stairs into the basement.

B. The Stevens Farm Road Pump Station was constructed in 1996. The station consists of two 10-hp Gorman Rupp T3 self-priming suction-lift pumps rated for 125 gpm and housed in a concrete and brick dry well structure. The wet well is located a few feet outside of the building and is accessible through a hatch. The station consists of two levels, with the backup generator upstairs and the pumping system downstairs.

C. The Arcadia Road Pump Station was constructed in 1985. The building is divided into two-halves in a wet well/dry well configuration. The right half of the building serves as the dry well, with three 40-hp Smith & Loveless flooded-suction vertical centrifugal pumps (installed in 2008) rated for 1300 gpm @ 64' TDH downstairs, and electrical components and emergency generator upstairs. The wet well is located in the left-half of the building and is accessible through a second doorway and stairs into the basement. The building has an attached garage with a small amount of storage space. Like the other wastewater pumping stations, the station is connected to SCADA, and communications are via a radio antennae mounted on the building. Building security is limited to locks on the access doors. There is no lock on the wet well access hatch. There are two cam-lock connections (one at the front of the building, and another in the yard) to provide bypass pumping from the wet well to the force main.

D. The Sycamore Road Pump Station is a small submersible pumping station installed in 1987 that has two, 2-hp Meyers submersible pumps (installed in 2010) rated for 36 gpm. The wet well is located several feet from the control panel with access via a manhole cover located in the roadway.

E. The Brook Street Pump Station was brought into service in 1985. The building is divided into two-halves in a wet well/dry well configuration. The right half of the building serves as the dry well, with two 20-hp Smith & Loveless flooded-suction vertical centrifugal pumps rated for 475 gpm @ 72' TDH (installed in 2008) and one 25-hp Fairbanks Morse flooded-suction vertical centrifugal pump (installed in 2003) downstairs, and electrical components and emergency generator upstairs. The wet well is located in the left-half of the building and is accessible through a second doorway and stairs into the basement. There are two cam-lock connections located at the front of the building to provide bypass pumping from the wet well to the force main.

1.4 PROJECT/SITE CONDITIONS

A. Permits

1. Obtain the permits and approvals listed below:

a. Permits and licenses of a temporary nature necessary to perform the Work.

b. Permits for disposal of construction wastes including disposal of cleared and grubbed materials.

c. Other permits or licenses required for the Contractor's operations or required elsewhere in the Contract Documents and not included herein.

2. Comply with the permits and approvals listed below:

a. Local Building Permits

3. Obtain required time extensions to permits obtained by the Contractor, if construction authorized by permits has not been completed by the expiration date noted on these permits.

4. Obtain permits and approvals from appropriate jurisdictional agencies and property owners for use of premises not furnished by the Owner, and for all off-site areas.

5. Submit copies of permits prior to performance of Work authorized by permits.

B. Existing Conditions

1. Use of Premises and Off-site Work

a. The Work shall occur on the Owner's property within the limits of Work shown on the Drawings.

b. Land owned by the Owner is available for staging upon approval of site usage plan by Owner.

c. Obtain permits and approvals for use of any land and access thereto that is deemed necessary for the Work, where such land is not available for use by the Owner, including land for temporary construction facilities, access and egress, or for storage of materials. Confine apparatus and storage to such additional areas.

d. Obtain permits and written approvals from appropriate jurisdictional agencies for the use of premises not available for use by the Owner, including all offsite staging areas, borrow pits and waste areas. Submit copies of all permits and approvals to the Owner prior to using areas.

e. Provide for the disposal of waste materials off-site in accordance with all applicable laws.

f. Adhere to the limits of Work as indicated, to minimize obstruction to traffic and inconvenience to the Owner, general public, and residents in the vicinity of the Work, and to protect people and property. Keep fire hydrants on or adjacent to the Work accessible to fire fighting equipment at all times.

g. Make temporary provisions for the use of sidewalks and maintain functioning gutters, stormwater systems, drainage ditches, and culverts.

h. Maintain public access to businesses and residences including driveways and parking lots at all times during the Work.

PART 2 PRODUCTS

2.1 MATERIALS FURNISHED BY OWNER

A. The Owner will not furnish any materials, labor or equipment under this Contract.

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Work Schedule
2. Construction Constraints
3. Vehicle Access
4. Available Work Area
5. Site Usage Plan

B. Related Requirements

1. Section 01310 - Coordination
2. Section 01325 - Scheduling of Construction
3. Section 16050 – Basic Electrical Requirements

1.2 SUBMITTALS

A. Incorporate the requirements of this Section in the project schedule submitted under Section 01325.

B. Action Submittals

1. Submit site usage plan within 30 days of the Notice to Proceed.
2. Submit channel bypass plan for Brook Street and Conant Road pump station within 30 days of Notice to Proceed.

1.3 WORK SCHEDULE

A. Conduct the Work during daylight hours on Monday through Friday, and within the time between 7:00 a.m. and 3:00 p.m. No work is to be done on Owner's holidays, Saturdays, Sundays or outside of the work hours described above. No equipment or machinery may be started at the sites before 7:00 a.m. and all equipment must be shut off by 3:00 p.m.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CONSTRUCTION CONSTRAINTS

A. The following are constraints for the Work. Incorporate these constraints into the schedule required to be submitted under Section 01325.

1. All components of the existing facilities must remain in operation throughout construction of the new facility unless otherwise specified herein or in Section 01310.

2. Contractor will be responsible for the provision of all equipment, training, and personnel necessary to complete the work in compliance with all applicable safety regulations.

3. If the influent channel grinder is to be bypassed for work on one or more of the wet wells, then a temporary screenings and screenings removal system or channel grinding system shall be provided.

4. Brook Street Pump Station Pump & Check Valve Replacement

    a. Provide a minimum of two weeks' notice prior to the replacement of Pump No.1 and discharge check valve.

    b. Coordinate with the Owner the closing of the Pump No. 1 suction line knife gate. Work shall not commence until the knife gate is closed.

    c. Only wet well tank No. 1 may be offline while the replacement of Pump No. 1 in the Brook Street Pump Station is occurring. This shall ensure that at least two wet well tanks and two pumps are in operation while this work is occurring.

5. Brook Street and Conant Road Pump Stations Sluice Gates

    a. Contractor is responsible for isolating and bypassing the wet wells as needed to perform the work. This may include the use of bypass pumping systems, existing, proposed or temporary gates, or other means allowed in the Engineer approved bypass plan that shall be submitted by the Contractor.

    b. Contractor shall allow for operation of at least one wet well tank at all times during construction. During the replacement of the sluice gates, the Contractor shall use Engineer approved methods to isolate one tank of the wet well from the others during performance of the work.

    c. Contractor shall perform work to the sluice gates such that the work on the sluice gates in one wet well tank is complete, tested, and accepted prior to commencing the work associated with the sluice gates in the subsequent wet well tanks.

    d. The new sluice gates can be used once accepted in order to isolate the wet well tanks for construction purposes.

6. Motor Control Center

    a. Refer to Specification Section 16050, Basic Electrical Requirements, for sequencing and scheduling.

3.2 VEHICLE ACCESS

A. Vehicles shall park in the pump stations' driveways.

B. If necessary, Contractor may park along street or on pump stations' lawn. Lawn or other property damage caused by ruts from construction or other Contractor vehicles shall be repaired by the Contractor.

3.3 AVAILABLE WORK AREA

A. Limits of construction are defined on the Drawings. No work will be permitted to be performed outside these boundaries.

3.4 SITE USAGE PLAN

A. Contractor to submit proposed site usage plan for approval.

END OF SECTION

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SECTION 01290

APPLICATION AND CERTIFICATE FOR PAYMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Definition and description of measurement and payment to be used for the Work
2. Payment procedures
3. Payment requests for stored materials

B. Related Requirements

1. Section 01295 - Schedule of Values

1.2 GENERAL

A. The following paragraphs describe payment procedures for the work to be done under the respective items in the Bid Form.

B. Each lump sum will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's overhead and profit for each separately identified item.

C. No separate measurement or payment will be made for Work called for in Division 0 or Division 1 of the Contract Specifications, unless specifically covered under the Bid items listed below. All costs associated with this Work will be considered incidental to the Contract Bid price.

D. Division 2 through Division 16 Work will be measured and paid for at the Contractor's lump sum Bid price as indicated on the Bid form. Those payable Work items, and related prices as Bid, will be the basis for all compensation to the Contractor for Work performed under this Contract. Work not specifically included as a Bid item, but which is required to properly and satisfactorily complete the Work is considered ancillary and incidental to the Bid item Work, and payment for such Work is considered to be included in the values as Bid for payable items.

1.3 LUMP SUM ITEMS

A. Each lump sum price stated in the Bid form shall constitute full compensation for all labor, equipment and materials necessary and required to complete the work specified under that particular item, and also all costs for doing related work as set forth in the Contract Documents or implied in carrying out their intent.

B. Item 1 – Pump Stations Improvements

1. Measurement

a. There will be no measurement of quantities for lump sum items. Periodic partial payments for this Work, included under the Agreement,

shall be based on the percent completion of each work item listed in the Schedule of Values provided under Section 01295 estimated by the Contractor and approved by the Engineer.

2. Payment

a. The lump sum payment shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for the construction of the Town of Westwood Pump Station Maintenance & Improvements Project other than that covened by Item 2 (Electrical Sub-Bid).

1.4 PAYMENT PROCEDURES

A. Informal submittal: Unless otherwise directed by the Engineer:

1. Make an informal submittal of request for payment by filling in, with erasable pencil, pertinent portions of EJCDC C-620, Contractor's Application for Payment, plus continuation sheet or sheets.

2. Make this preliminary submittal to the Engineer at the last regular job meeting of each month.

3. Revise the preliminary submittal as approved by the Engineer and incorporate the approved payments into the formal submittal.

B. Formal submittal: Unless otherwise directed by the Engineer:

1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or electronically on EJCDC C-620, Contractor's Application for Payment, plus continuation sheet or sheets.

2. Sign and notarize the Application for Payment.

3. Submit the original of the Application for Payment, plus six identical copies of the continuation sheet or sheets, to the Engineer.

4. The Engineer will compare the formal submittal with the approved informal submittal and, if acceptable, will sign the Contractor's Application for Payment, and present the Application to the Owner.

5. Provide a signed and notarized Certificate for Stored Materials and proof of storage in a dry, watertight, heated and insured warehouse facility.

1.5 PAYMENT REQUESTS FOR STORED MATERIALS

A. Requests for payment for stored materials shall be made in accordance with Section 00700 and shall be accompanied by the attached "Certificate for Stored Materials" form.

B. Partial payment requests for materials stored or so-called "engineering costs" by equipment manufacturers will not be allowed. All such costs shall be distributed proportionately among the various items of equipment/hardware to be furnished.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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CERTIFICATE FOR STORED MATERIALS

_____
Tighe & Bond Project No.

We, _____, request payment for materials and/or equipment not incorporated in the work included under our firm's contract with _____ as listed below.

We hereby certify under penalty of perjury, that the materials not incorporated in the work have been delivered and are securely stored at the site or at _____ and that we have title to said materials.

We also certify that an inventory of said materials and/or equipment has been compiled for the purposes of this monthly partial payment request. This list of materials and/or equipment, including unit prices for said material not incorporated in the work for which payment is hereby requested, consisting of _____ pages and dated _____, is signed and attached hereto.

We acknowledge that payments made based on this request for materials and/or equipment not incorporated in the work does not relieve the contractor of its responsibility for furnishing all materials and equipment required for the satisfactory completion of the project pursuant to the contractual requirements.

We further certify that we can and will adequately protect said materials and/or equipment until they are incorporated in the work; that they meet the requirements of the specifications, and that they will be needed for incorporation in the work in the near future.

IN WITNESS WHEREOF, we, the said _____ hereunto set our hand and seal this _____ day of _____, 20__.

_____
Contractor's Firm Name

SIGNED, SEALED AND DELIVERED IN THE PRESENCE OF

By_____

Title _____

_____
Notary Public

SCHEDULE OF STORED MATERIALS

Job No. _____
Contract No. _____
Contractor: _____
Location: _____
_____

Date _____
Pay Estimate _____

Item	Description	Supplier/Manufacturer	Quantity Stored and not Incorporated	Unit $	Certified Value

Signature: _____
Contractor's Principal

Total Amount Due for Stored Materials _____

Title: _____

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Contractor's Application for Payment No. _____

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

Application For Payment

Change Order Summary

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

1. ORIGINAL CONTRACT PRICE..... $ _____

2. Net change by Change Orders..... $ _____

3. Current Contract Price (Line 1 ± 2)..... $ _____

4. TOTAL COMPLETED AND STORED TO DATE

(Column F on Progress Estimate)..... $ _____

5. RETAINAGE:

a. X _____ **Work Completed**..... $ _____

b. X _____ **Stored Material**..... $ _____

c. Total Retainage (Line 5a + Line 5b)..... $ _____

6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... $ _____

7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... $ _____

8. AMOUNT DUE THIS APPLICATION..... $ _____

9. BALANCE TO FINISH, PLUS RETAINAGE

(Column G on Progress Estimate + Line 5 above)..... $ _____

Contractor's Certification

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

By:	Date:

Payment of: $ _____

(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____

(Engineer) (Date)

Payment of: $ _____

(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____

(Owner) (Date)

Approved by: _____ _____

Funding Agency (if applicable) (Date)

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Progress Estimate - Lump Sum Work

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

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

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SECTION 01295

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Schedule of Values

1.2 SUBMITTALS

A. Action Submittals

1. Submit 3 copies of the Schedule of Values for approval within 10 days after the Effective Date of the Agreement.

1.3 SCHEDULE OF VALUES

A. Schedule of Values shall be a detailed breakdown of the lump sum Work items showing values allocated to the various elements of the Work.

B. The format of the Schedule of Values shall be a breakdown by Specification Section and content and shall be submitted on EJCDC C-620, Contractor's Application for Payment. The Engineer may require additional detailed documentation to support the values in the form of executed purchase orders, subcontracts, or other agreements.

C. The Engineer will determine the level of breakdown and detail required. The breakdown shall include materials, installation, and start-up for equipment and controls where applicable. The final document will be the basis of payment requests for the duration of the Contract. No progress payment will be made until the Schedule of Values is approved by the Engineer.

D. An unbalanced Schedule of Values providing overpayment on items of work performed first will not be accepted.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01310

COORDINATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Project Management
2. Coordination
3. Project Meetings

B. Related Requirements

1. Section 01140 - Work Restrictions
2. Section 01325 - Scheduling of Construction

C. Related Work Not Included

1. Operation of existing facilities will be performed by the Owner unless otherwise specified. The Owner will assist in arranging operation of any existing facilities or equipment required by the Contractor to connect to existing facilities, and the Contractor shall not operate existing valves or equipment. Only the Owner will operate Owner valves.

1.2 SUBMITTALS

A. Incorporate the requirements of this Section, as well as Work which may impact the existing system operation, or the operations of any adjacent utility, in the project schedule submitted under Section 01325.

B. Informational Submittals

1. Submit to the affected utility company, the Owner, and the Engineer, in writing, all requests for temporary shutdowns of facilities or interruption of operations. No shutdowns of the pump stations or interruptions to existing operations will be permitted except as outlined in this Section. Submit requests at least 2 weeks prior to the beginning of the Work requiring shutdown or interruption. No shutdown shall occur without the approval of the utility company or the Owner.

2. At the pre-construction conference, supply to the Owner the cell phone number of a responsible person who may be contacted during off-hours for emergencies 24 hours a day, seven days a week.

3. Prepare a contact list of phone numbers, including cell phone numbers, and emails for all Project personnel and submit to the Engineer at the pre-construction conference. Include Contractor, Owner, Engineer, and Town personnel including police, fire, and ambulance.

4. Submit to the Owner and Engineer, in writing, all requests for valve operations at least 2 weeks prior to commencing operation.

1.3 PROJECT MANAGEMENT

A. Complete the Work in a continuous uninterrupted operation. Use sufficient personnel and adequate equipment to complete the Work within the Contract Time.

1.4 COORDINATION

A. Do not interfere with the operation of the existing facilities.

B. Perform all coordination necessary to complete connections to the existing piping, tanks, channels, and electrical system.

C. Coordinate with appropriate utility companies, as well as with the Owner, where the Work crosses or is adjacent to existing utilities.

1.5 PROJECT MEETINGS

A. Pre-Construction Conference

1. The Contractor shall be prepared to discuss the following subjects at the Pre-Construction Conference. Documentation for these items is required to be submitted within the time frames included in individual specification sections.

a. Project scheduling

b. Sequencing of critical path Work items

c. Shop Drawing procedures

d. Project changes and clarification procedures

e. Use of sites, access to Work areas, office and storage areas, security and temporary facilities

f. Contractor safety plan and representative

g. Progress payments and procedures

h. Required documentation

i. Project personnel contact list

B. Progress Meetings

1. Progress meetings will be held as requested by the Owner or as required by the Progress of the Work.

2. The Contractor's Superintendent shall attend all progress meetings.

3. At a minimum, progress meetings will review Work progress, schedule, Shop Drawing submission schedule, Applications for Payment, and other matters needing discussion and resolution.

4. Review the schedule with all parties to be affected by upcoming work.

5. Review the monthly construction report required under Section 01325.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Notify DIGSAFE at 1-888-344-7233 at least 72 hours prior to any digging, trenching, rock removal, demolition, borings, backfill, grading, landscaping, or any other earth moving operations.

3.2 COORDINATION WITH THE OWNER'S OPERATIONS

A. Notify the Owner and Engineer, in writing, a minimum of 1 week in advance of commencing Work on site.

B. Notify the Owner and Engineer, in writing, a minimum of 1 week before commencing any work which may affect the Owner's operations.

C. Perform all construction activities so as to avoid interference with operations of the facility and the work of others.

D. Coordinate the following operations with the Owner and the Engineer:

1. Operation of existing valves. The opening and closing of existing valves will be performed by the Owner.

2. Operation of the existing sewage pump stations. The Owner will operate all existing facilities. Do not operate any existing equipment without the Owner's approval. The Owner will operate existing facilities or equipment that may be required in order for the Contractor to make connections to existing facilities.

3. Bypass of influent pumping station channels.

4. Timing and duration of wet well tank shutdowns for sluice gates and pump replacement.

5. Timing and duration of any required electrical or control systems shutdowns.

E. The Owner has the authority to order the Work stopped which could unreasonably result in stopping the necessary functions of the pump stations. Any costs and/or delays associated with these work stoppages due to the Contractor's operation shall be borne by the Contractor.

3.3 SEQUENCE OF CONSTRUCTION

A. Constructing the proposed improvements while maintaining existing operations will require a specific sequence of construction. The Contractor will be allowed reasonable flexibility in scheduling the construction activities. Provide a detailed construction schedule as required in Section 01325.

3.4 SHUTDOWNS

A. The sewage pump station will not be shut down during the course of construction activities. If pump station shut down is required, Contractor shall be responsible for bypass pumping.

B. In the Conant Road and Brook Street pump stations, one of the three wet well tanks may be removed from service at one time to allow for replacement of the sluice gates. A second wet well may be temporarily dewatered for up to two hours to allow for the installation of temporary dams or gates that will facilitate work in the adjacent wet well chamber.

1. Contractor to submit proposed temporary bypass and wet well tank isolation plan for Engineer's approval.

C. Rescheduling or reactivation of any temporary shutdowns may be required if an emergency occurs in the sewer system, such as a major storm event, pipeline break, pump failure or other occurrence.

D. Test all pumps, pipelines, valves and appurtenances and place in operating condition before the final tie-ins are made to connect new equipment within the existing facility.

E. Furnish all labor, materials, tools and equipment necessary to provide temporary light, ventilation, safety personnel and equipment, gas monitoring equipment, supports and braces necessary to perform the tie-in work in a safe and secure manner. Observe all safety regulations in force at the existing facilities.

END OF SECTION

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SECTION 01320

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Photographs taken at specified intervals before, during and after construction.

1.2 SUBMITTALS

A. Informational Submittals

1. Submit electronic files of each photograph on a CD.

1.3 QUALITY ASSURANCE

A. Secure the services of a professional photographer who has at least 5 years' experience in construction photography. Submit work samples to the Engineer if requested. The photographer shall not be changed without written approval by the Engineer.

B. Image Quality

1. Photographic documentation shall be color digital.

2. Photographic images shall be suitably staged and set up ("framed"), focused, and shall have adequate lighting.

3. For still photographs, use camera with minimum 7.0-megapixel resolution. Photographs shall be clear and focused and of sufficient resolution to discern details as may be required by the Engineer. Photographs which are blurred, or are over or under exposed, shall be considered unacceptable. The Engineer will be the sole judge of acceptability.

PART 2 PRODUCTS

2.1 CONSTRUCTION PHOTOGRAPHS

A. Electronic files shall be in .jpg format.

1. Image resolution shall be sufficient for clear, high-resolution prints. Minimum resolution shall be 150 dots per inch (dpi). Minimum size of digital images shall be equal to specified print size.

2. Do not imprint date and time in the image.

3. Electronic image filename shall describe the image; do not submit filenames automatically created by digital camera. For example, an acceptable electronic filename would be, "PS #1 – Looking West.jpg".

4. Each CD shall contain an index file listing the file name of each photograph and the description, date and time of the photograph.

5. Submit three copies of each disc with photographic images.

PART 3 EXECUTION

3.1 PRECONSTRUCTION PHOTOGRAPHY

A. The area to be photographed shall include, but not be limited to, the area within and adjacent to the proposed construction, including roadways, utilities, driveways, landscaping, trees, structures and buildings.

B. Provide a minimum of 12 preconstruction photographs.

C. The view selection will be determined by the Engineer.

3.2 PROGRESS PHOTOGRAPHY

A. Take construction photographs at 2 week intervals of active work areas throughout the life of the Contract. The photographs shall be indicative of the work that is currently in progress. A minimum of 5 photographs shall be taken at each scheduled interval at each location where Work is in progress.

B. Take a minimum of 24 post construction photographs.

C. Take photographs of each site prior to and after backfilling and grading. The photographs shall show any foundation work performed.

D. Take photographs of utility abandonments.

E. Take photographs of relocated utility connections.

F. Take daily photographs of work that is believed to be out of scope.

G. Submit photos on a monthly basis concurrently with the request for payment.

END OF SECTION

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SECTION 01325

SCHEDULING OF CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Progress Schedule

B. Related Requirements

1. Section 00700 – General Conditions
2. Section 01140 - Work Restrictions
3. Section 01310 - Coordination

1.2 REFERENCES

A. The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry, an Associated General Contractors (AGC) of America publication.

1.3 PROGRESS SCHEDULE

A. Graphically show the order and interdependence of activities, sequence of Work, how the start of a given activity depends on completion of preceding activities, and how completion of an activity may restrain the start of subsequent activities.

B. The Work shall be planned by the Contractor and his Project field superintendent in coordination with all Subcontractors and Suppliers whose Work is shown on the Progress Schedule.

C. Include, at a minimum, the following activities on the Progress Schedule:

1. Project mobilization
2. Submittal and approval of Shop Drawings
3. Procurement of equipment and critical materials
4. Installation of equipment and critical materials
5. Fabrication of special equipment and material, and its installation and testing
6. Final inspecting and testing
7. Punchlist
8. Final cleanup
9. Other activities that may be critical to the Progress Schedule
10. All activities of the Owner and the Engineer which affect progress and/or affect required dates for completion of the Work

D. Take into consideration Shop Drawing submittal and approval time, the delivery times of equipment and materials, Subcontractors' Work, availability and abilities of workmen, weather conditions, any restrictions in operations at the Work site, and all other items that may affect completion of the Work within the Contract Time.

E. The Progress Schedule shall reflect the requirements and constraints outlined in Section 01310, Coordination.

F. The Progress Schedule shall reflect Work restrictions outlined in Section 01140.

G. Show information in such detail that duration times of activities will range from one to 15 days. The selection and number of activities shall be subject to the approval of the Owner and Engineer.

H. The Progress Schedule should show preceding and following event numbers for each activity, description of each activity, and activity duration in calendar days.

I. Submit the Progress Schedule on maximum sheet size 30-inches high by the width required.

1.4 SUBMITTALS

A. Informational Submittals

1. Submit four prints of the preliminary Progress Schedule prepared in accordance with Article 2.05 of Section 00700 and the requirements of this section. Progress schedule must be submitted within 10 days after the Effective Date of the Agreement. Progress Schedule must be approved by the Owner and Engineer before the first progress payment will be made.

2. Revised analyses - Within 10 days after receipt of the review comments, submit four prints of the Progress Schedule revised in accordance with those comments.

3. Periodic reports - On the first progress meeting of each month, submit four prints of the updated Progress Schedule, as well as a report of construction activities in the prior month.

4. Before initiating the Work, submit an estimated monthly rate of Contractor payments for the project. If the payment schedule deviates from the original projection, submit a revised rate of expenditure schedule.

1.5 PERIODIC REPORTS

A. At scheduled progress meetings, present four copies of a construction report which details the Work performed during the preceding period. The report shall include the following at a minimum:

1. Actual progress of Work. Update the Progress Schedule accordingly.

2. The Progress Schedule, or revised Progress Schedule, should show the portions of the Progress Schedule impacted by the Work progress.

3. Activities or portions of activities completed during the reporting period, and their total value as basis for Contractor's periodic request for payment. Payment made will be based on the total value of such activities completed or partially completed after verification by the Engineer.

4. State the percentage of the Work actually completed and scheduled as of the report date, and the progress along the critical path in terms of days ahead of or behind the dates defined in the Progress Schedule.

5. If the Work is behind the dates set forth in the Progress Schedule, also report progress along other paths with negative slack.

6. Include a narrative which includes:

   a. A description of problem areas, anticipated and current

   b. Delaying factors and their impact

   c. An explanation of corrective actions taken or proposed

7. Show the date of latest revision.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Action Submittals

2. Informational Submittals

1.2 DEFINITIONS

A. Action Submittals – includes written and graphic information submitted by Contractor that requires Engineer's approval.

B. Informational Submittals – includes information submitted by Contractor that does not require Engineer's approval. The Engineer will acknowledge receipt of such documents and provide comments when the submittals lack the detail required by the Contract Documents.

1.3 ACTION SUBMITTALS

A. Shop Drawings

1. Shop Drawings as defined in the General Conditions, and as specified in individual work sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation drawings, schedule information, piece part drawings, actual shopwork manufacturing instructions, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certification, as applicable to the Work.

2. Shop Drawings shall be of standardized sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard size drawings shall be

   a. 24-inches by 36-inches

   b. 22-inches by 34-inches

   c. 11-inches by 17-inches

   d. 8.5-inches by 11-inches

3. Submit Shop Drawings at the proper time so as to prevent delays in delivery of materials. Coordinate submittals for related or interdependent equipment.

4. Advise the Engineer in writing of any deviations from the requirements of the Contract Documents.

5. Check all Shop Drawings regarding measurements, size of members, materials, and details to determine if they conform to the Contract Documents. Shop Drawings found to be inaccurate, not in compliance, or

otherwise in error shall be returned to the Subcontractors or Suppliers for correction before submission to the Engineer. Drawings that are current shall be marked with the date, name, and approval stamp of the Contractor.

6. All details on Shop Drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the Shop Drawings before being submitted for approval.

7. Detailed installation drawings (sewers, equipment, piping, electrical conduits and controls, HVAC work, and plumbing, etc.) shall be drawn to scale and fully dimensioned.

8. No material or equipment shall be purchased or fabricated until the required Shop Drawings have been submitted and approved. Materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by the Shop Drawings.

9. Until the necessary approval has been given, do not proceed with any portion of the work, the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which approval is required.

10. If submitted equipment requires modifications to the structures, piping, layout, or other details shown on the Drawings, details of the proposed modifications must also be submitted for approval. If such equipment and modifications are approved, perform all Work necessary to make such modifications at no additional cost to the Owner.

B. Product Data: Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing, and printed product warranties, as applicable to the Work.

C. Samples and color selection charts: Provide sample, when requested by individual Specification to establish conformance with the Specifications, and as necessary to define color, texture and pattern selections available.

D. Product Substitutions: In accordance with Section 01630.

E. Operation and Maintenance Manuals: In accordance with Section 01770.

F. Schedule of Values: In accordance with Section 01295.

G. Site Usage Plan: In accordance with Section 01140.

1.4 INFORMATIONAL SUBMITTALS

A. Schedule of Submittals

1. Submit a preliminary Schedule of Submittals within 10 days of the Effective Date of the Agreement in accordance with Article 2.05 of Section 00700.

B. Schedule of Manufacturers and Suppliers

1. Submit a schedule of manufacturers and Suppliers within 7 days after Notice to Proceed including the names and addresses of the manufacturers and Suppliers of materials and equipment to be incorporated into the Work.

C. Schedule of Major Products

1. Submit a schedule of major products within 30 days after Notice to Proceed including a complete list of major products proposed for use, with specification section number, name of manufacturer, trade name, and model number of each product.

D. Product Listing and Manufacturers Qualifications

1. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards. Specifically identify the products, the anticipated schedule for delivery and storage, and the estimated value thereof for materials which the Contractor intends to request approval for off-site storage.

E. Certificates of Compliance

1. General:

a. Submit sworn certificates from the manufacturer or material supplier that the materials and fabrications provided under the Specification section conform with the Contract Documents.

b. Certificates shall be signed by an officer of the manufacturer's corporation and witnessed by a Notary Public.

2. Welding: Submit in accordance with individual Specification sections.

3. Installer: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements as specified in individual Specification sections.

4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency, or when specified in individual Specification sections.

6. Manufacturer's Certificate of Compliance: In accordance with individual Specification sections.

F. Application for Payment

1. Submit applications for payment in accordance with Section 01270, Measurement and Payment or Section 01290, Application and Certificate for Payment.

2. Submit schedule of stored materials when requesting payment for materials not yet installed.

G. Construction Photography and Videography: Provide preconstruction, progress, and post-construction photography and videography in accordance with Sections 01320 and 01321.

H. Contract Closeout Submittals: In accordance with Section 01770.

I. Contractor Design Data

1. Written and graphic information

2. List of assumptions

3. List of performance and design criteria

4. Summary of loads or load diagram

5. Calculations

6. List of applicable codes and regulations

7. Name and version of software

8. Information requested in individual Specification section

J. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification sections.

K. Schedules - Submit construction progress schedules and schedule updates in accordance with Section 01325.

L. Statement of Qualifications: Submit evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty subcontractor, trade, specialist, consultant, installer, and other professionals.

M. Submittals Required by Laws, Regulations, and Governing Agencies

1. Submit promptly notifications, reports, certifications, payrolls, and other required information as may be required, directly to the applicable federal, state, or local governing agency or their representative.

2. Transmit to Engineer for Owner's records, one copy of correspondence and transmittals (including enclosures and attachments) between Contractor and governing agency.

N. Test and Inspection Reports

1. Submit test and inspection reports as required by individual Specification sections.

2. Test and inspection reports shall contain signature of person responsible for test or report.

3. Reports shall include identification of product and Specification, project name, date and time of test, type of test, location, test results, corrective action required if report indicates test is not in compliance with Contract Documents, interpretation of test results, and other information as required in individual Specification sections.

O. Equipment Data: Submit information on equipment to be used in the performance of the Work as required by individual Specification sections.

P. Testing and Start-up Data: Prepare and submit testing procedures proposed to perform testing required by individual Specification sections.

Q. Vendor Training Plan: At least two weeks prior to scheduling training of Owner's personnel, submit lesson plans for vendor training in accordance with individual Specification section and manufacturer's Operations and Maintenance Manuals.

R. Health & Safety Plans: When specified in individual Specification sections, prepare and submit a Health and Safety Plan modified or supplemented to include job-specific considerations.

S. Submittals stamped by another Professional Engineer: When specified in individual Specification sections, prepare and submit calculations and/or drawings stamped by a Professional Engineer licensed in the State where the work is being performed.

T. Coordination Drawings: When specified in individual Specification sections, prepare and submit drawings to show how multiple system and interdisciplinary work will be coordinated. Examples are conduit routing diagrams, duct layouts, utility coordination drawings, sprinkler plans etc.

U. Work Plans: When specified in individual Specification sections, prepare and submit copies of all work plans needed to demonstrate to the Owner that Contractor has adequately thought-out the means and methods of construction and their interface with existing facilities.

V. Erosion Control Plan: When specified in Contract Documents or required by local ordinances or regulations, prepare and submit copies of erosion control plans.

W. Traffic Control Plan: When specified in Contract Documents or required by local ordinances or regulations, prepare and submit copies of traffic control plans.

X. Shutdown Requests: Submit notification of any outages required (electrical, flow processes, etc.) as may be required to tie-in new work into existing facilities. Unless otherwise specified, provide outage requests a minimum of 7 days notice shall be provided.

Y. Equipment Data: When specified in other Specification sections, information on equipment used by the Contractor to complete the Work, such as compaction equipment and closed-circuit television inspection equipment.

1.5 PROCEDURES

A. Coordination

1. Prepare and submit documentation in advance of fabrication and product manufacturer, so that the installation will not be delayed, other related work can be properly coordinated, and there is adequate time for review and resubmission, if required.

2. Provide no less than 30 days for review of submittals from the time received by the Engineer. For submittals of major equipment, that require more than 30 days to review, due to complexity and detail or those requiring review by multiple engineering disciplines, Engineer will notify Contractor of the circumstances and identify the anticipated date when the submittal will be returned.

3. Re-submittals will be subject to same review time.

4. No extension of time will be authorized due to failure to provide approvable submittals sufficiently in advance of the Work.

B. Review Shop Drawings, product data, and samples prior to submission and verify and determine:

1. Field measurements

2. Conformance with the Contract Documents. Advise the Engineer in writing of any deviations from the requirements of the Contract Documents.

3. Delete or strike out information that is not applicable to the Work.

C. Upload the electronic submittal files via Newforma Information Exchange. Access to Newforma Information Exchange will be provided by the Engineer. Files must be in .pdf format. The submittals will be returned in electronic .pdf format via Newforma Information Exchange.

D. Numbering: Submissions shall be accompanied by a transmittal form referencing the project name and applicable Specification section. Submittals shall be numbered sequentially, with the applicable Specification section and a hyphen preceding the number. (*e.g.* Submittal number 11330-01) Resubmittals shall bear the same transmittal number with a sequential letter suffix commencing with "A". (*e.g.* Submittal number 11330-01A)

E. Provide a copy of the Submittal certification form (copy attached at the end of this section) which shall be attached to every copy of each Submittal as required under Article 7.16 A.2 of Section 00700. Apply the Contractor's stamp and initials or signature certifying that the submission has been thoroughly reviewed for completeness, compliance with the Contract Documents, coordination with adjacent construction and dimensional compatibility. Items submitted without the stamp or that are incomplete will be returned by the Engineer for rework and resubmission.

F. Provide a copy of the P.E. certification form (copy attached at the end of this section) which shall be attached to every copy of each Submittal stamped by another Professional Engineer. Items submitted without the completed certification form will be returned by the Engineer for resubmission.

G. Distribute copies of reviewed submittals along with the Engineer's transmittal to concerned parties with instructions to promptly report any inability to comply with the provisions or integrate the requirements with interfacing work.

H. Partial and Incomplete Submittals

1. Shop Drawings shall be submitted as a complete package by Specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials, and samples associated with each Specification section be included as a single submittal for the Engineer's review.

2. Engineer will return entire submittals if preliminary review deems it incomplete including:

a. Missing or incomplete Submittal certification form

b. Insufficient number of copies

c. Missing content

3. Partial submittals may be considered, at Engineer's option, only when necessary to expedite the Project.

4. Partial submittals shall be clearly identified as such on the transmittal to identify missing components.

I. Submittals not required by the Specification will be returned without review or action code.

J. Resubmission

1. Make corrections and modifications required by the Engineer and resubmit until approved.

2. Clearly identify changes made to submittals and indicate other changes that have been made other than those requested by the Engineer.

3. A maximum of two re-submissions of each shop drawing will be reviewed, checked and commented upon without charge to the Contractor (total of 3 submittals). Any additional submissions which are required by the Engineer to fulfill the stipulations of the Contract Documents will be charged to the Contractor as described in paragraph 7.16.E.2 of Section 00700.

K. Distribution

1. Distribute approved Shop Drawings and approved product data to the Project Site and elsewhere as required to communicate the information to Suppliers, Subcontractors, and field personnel.

1.6 ENGINEER'S REVIEW

A. The Engineer will review submittals for design, general methods of construction and detailing. The Engineer's review and approval of submittals shall not be construed as a complete check nor does it relieve the Contractor from responsibility for any departures or deviations from the requirements of the Contract Documents unless he has, in writing, called the Engineer's attention to such deviations at the time of

submission. It will not extend to means, methods, technique, sequences, or procedures of construction (except where specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.

B. The Engineer's review of the submittals shall not relieve the Contractor from the responsibility for proper fitting of the Work, or the responsibility of furnishing any work required by the Contract Documents which may not be indicated on the submittals. The Contractor shall be solely responsible for any quantities shown on the submittals.

C. If the Contractor considers any correction indicated on the submittals to constitute a change to the Contract Documents, the Contractor shall provide written notice to the Engineer at least 7 working days prior to release for manufacture.

D. When the submittals have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

E. Action submittals as defined in paragraph 1.2 will be reviewed and returned under one of the following codes:

1. Approved (Action Code 1) is assigned when there are no notations or comments on the submittal. Equipment or materials may be released for manufacture, provided that it complies with requirements of the Contract Documents.

2. Approved as Noted (Action Code 2) is assigned when there are notations or comments on the submittal, but the equipment or materials may still be released for manufacture. All notations and comments must be incorporated in the final product. Resubmission is not necessary.

3. Revise and Resubmit (Action Code 3) is assigned when there are notations and comments requiring a resubmittal of the package. Work cannot proceed until the submittal is revised and resubmitted for review.

4. Not Approved (Action Code 4) is assigned when the submittal contains non-specified items or does not meet the requirements of the Contract Documents. It may also be assigned when there is a significant amount of missing material required for the Engineer to perform a complete review. The entire package must be resubmitted, 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.

F. Informational submittals as defined in paragraph 1.2 do not require approval by the Engineer. Such submittals will be returned under one of the following codes:

1. Receipt Acknowledged (Action Code 5) is assigned when the submittal is provided for documentation purposes and is acknowledged as received. Comments may be noted using this action code.

2. Revise and Resubmit (Action Code 6) is assigned when there are notations and comments requiring a resubmittal of the package.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SUBMITTAL CERTIFICATION FORM

PROJECT:_____
ENGINEER:_____ ENGINEER'S PROJECT NO.:_____
CONTRACTOR:_____ CONTRACTOR'S PROJECT NO.:_____

TRANSMITTAL NO.:_____ SUBMITTAL NO.:_____
SPECIFICATION NO.:_____ DRAWING NO:_____
DESCRIPTION:_____
MANUFACTURER:_____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the materials and/or equipment meets or exceeds the project specification requirements; that field measurements, dimensions, quantities, specified performance criteria, installation requirements, materials, catalog numbers and related materials have been verified; that all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the work has been determined and verified; that review includes all information related to the contractor's sole responsibility for means, methods, techniques, sequences, and procedures of construction and safety; and item has been coordinated with the overall project with:

☐ NO DEVIATIONS

☐ A COMPLETE LIST OF DEVIATIONS AS FOLLOWS:

_____
_____
_____
_____
_____
_____

SUBMITTED BY:_____ DATE:_____

GENERAL CONTRACTOR'S STAMP

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a professional engineer registered in the Commonwealth of Massachusetts and that he/she has been employed by

_____ to design
(Name of Contractor)

_____
(Insert P.E. Responsibilities)

In accordance with Specification Section _____for the

_____
(Name of Project)

The undersigned further certifies that he/she has performed the said design in conformance with all applicable local, state and federal codes, rules and regulations; and, that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

_____
(Insert Name of Owner)

or Owner's representative within seven days following written request therefor by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Address	Address

SECTION 01350

HEALTH & SAFETY PLAN

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Furnish all labor, equipment and materials and perform all operations in connection with monitoring air quality, decontaminating equipment and providing worker health and safety protection for all Contractor personnel.

2. Develop a site specific Health and Safety Plan (HASP) specifically addressing the potential hazards that may be encountered. This plan shall meet all OSHA requirements.

3. Review the requirements and data presented and supplement the program with any additional measures deemed necessary to fully comply with regulatory requirements and adequately protect personnel on the site.

1.2 REFERENCES

A. OSHA Regulation 29 CFR 1910.120

B. OSHA Regulation 29 CFR 1926.62

C. Massachusetts Contingency Plan, 310 CMR 40

1.3 DEFINITIONS

A. Site Safety Official (SSO) - The individual located on a hazardous waste site who is responsible to the Contractor and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

B. Uncontrolled Hazardous Waste Site - An area identified as an uncontrolled hazardous waste site by a governmental body, whether Federal, state, local or other where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both.

1.4 SUBMITTALS

A. Informational Submittals

1. Submit the following within ten (10) days after the Effective Date of the Agreement.

a. Site-specific HASP including the Emergency Response Plan for review, including provisions for decontamination and a contingency plan for unforeseen emergencies. The Engineer's review is only to determine if the HASP meets basic regulatory requirements and the minimum requirements of this section. The review will not determine the adequacy of the HASP to address all potential hazards, as that remains the sole responsibility of the Contractor.

1) The HASP must be reviewed, approved, and signed by a Certified Industrial Hygienist (CIH) or a Certified Safety Professional (CSP).

b. Current certification of employee's health and safety training and certification of employee's baseline medical exam status.

c. Certification of additional required health and safety training for supervisors.

d. Qualifications and experience of the SSO for approval.

2. Submit minutes of weekly safety meetings at periodic progress meetings.

1.5 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor is solely responsible for the health and safety of workers employed by the Contractor, any subcontractor and anyone directly or indirectly employed by any of them.

B. Work under this contract is not being performed on an "Uncontrolled Hazardous Waste Site," as defined in 29 CFR 1910.120 and Article 1.3 B, above. Develop and follow a site specific Health & Safety Plan (HASP) in accordance with the requirements of 29 CFR 1910.120 and paragraph 1.6.

C. Provide a full-time SSO regardless of whether or not the Work is at a defined Uncontrolled Hazardous Waste Site.

D. Pre-arrange emergency medical care services at a nearby hospital, including establishment of emergency routes of travel.

E. Conduct weekly safety meetings with all site personnel, documenting attendance and topics covered.

F. Train all workers assigned to areas where contaminated media are likely to be encountered in accordance with 29 CFR 1910.120.

G. In areas where contaminated media are likely to be encountered, monitor air quality in and around work area using appropriate air monitoring equipment, as indicated in Part 2. Record all readings and maintain record on site. Stop work and/or upgrade respiratory protection or personal protective equipment levels if action levels established in the HASP are exceeded. Ensure that degree and type of respiratory protection provided is consistent with the monitored concentrations and individual chemical parameters. Lawfully dispose of all contaminated clothing and equipment that cannot be decontaminated.

H. At all times, prevent oil or other hazardous substances from entering the ground, sewers, drainage areas and piping systems.

1.6 HEALTH & SAFETY PLAN (HASP) REQUIREMENTS

A. The following items shall be addressed in the HASP:

1. safety and health hazard assessment;

2. procedures for emergency medical treatment and first aid;

3. map indicating route to closest hospital for emergency medical care;
4. equipment decontamination procedures;
5. air monitoring procedures and action levels;
6. personal protective equipment and decontamination;
7. physical hazard evaluation and abatement including:
    a. equipment operation;
    b. confined space entry;
    c. slips and falls;
    d. building collapse;
    e. falling debris;
    f. encountering unmarked utilities;
    g. cold and heat stress;
    h. hot work (cutting and welding);
    i. excavation entry;
8. training requirements;
9. recordkeeping requirements;
10. emergency response plan that includes:
    a. names of three (3) Emergency Response Contractors, experienced in the removal and disposal of oils and hazardous chemicals, that the Contractor intends to use in the event of an emergency;
    b. evacuation routes and procedures;
    c. emergency alerting and response procedures.

1.7 CONTINGENCY MEASURES & NOTIFICATIONS

A. The potential for encountering hazardous buried objects or materials that could pose a threat to human health or the environment exists. In the event that potentially hazardous materials are encountered during the work under this contract, the responsibilities of the Contractor and the Engineer are described herein.

B. The procedures and protocols to be used by the SSO in defining materials that are potentially hazardous include screening with a photo-ionization detector, odor, visual appearance of a material, and obvious oil or chemical contaminated materials.

C. Upon encountering suspected hazardous buried objects or materials as described above, cover the excavation immediately if no imminent danger, as defined by the SSO, is present. If there is an imminent danger, as defined by the SSO, Evacuate the area immediately. The SSO shall then notify the Engineer and the Owner of the situation.

D. Establish, properly barricade, and mark the area as an exclusion zone under the direction of the SSO. The SSO shall establish the exclusion zone boundaries based upon air quality monitoring using a photo-ionization detector and other equipment as appropriate. The exclusion zone shall be established at a minimum 50-foot radius around the location where the potentially hazardous material is encountered. Work within the exclusion zone shall be discontinued until the hazardous condition has been remediated and testing indicates that a hazard does not exist. Other activities of the site, outside the limits of the exclusion zone shall continue. Ambient air quality monitoring shall be performed by the SSO to demonstrate that ambient air quality in other portions of the site is not adversely impacted by the exclusion zone condition.

E. Notify the Engineer and the Owner regarding the presence of potentially hazardous materials. The Owner may direct the Contractor to notify regulators and to obtain necessary regulatory approvals for remediation.

F. Mobilize the appropriate equipment and personnel to sample and test the hazardous material within the exclusion zone to determine the remedial action required, subject to the Engineer's direction. The Contractor may be directed to remove and legally dispose of the material. Compensation for the removal and disposal of hazardous material will be as a Change in Work and Change in Contract Price in accordance with the General Conditions, if not covered under a specific bid item.

PART 2 PRODUCTS

2.1 AIR MONITORING EQUIPMENT

A. Provide and maintain portable photo-ionization detector or organic vapor analyzer capable of detecting organic vapors or total hydrocarbons. Equipment shall be sensitive to the 0.5 parts per million (PPM) level.

B. Provide and maintain an oxygen analyzer to measure oxygen concentration in any trench or confined space prior to entry, as determined by the SSO.

C. Provide and maintain an explosimeter whenever the potential for accumulation of explosive gases exists, as determined by the SSO.

D. All air monitoring equipment shall remain the property of the Contractor.

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01420

REFERENCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Standards referenced in the Contract Documents.

1.2 GENERAL

A. Comply with the requirements of standards referenced in the Contract Documents.

1.3 ABBREVIATIONS

A. Abbreviations used in the Specifications are defined as follows:

1. AA – Aluminum Association
2. AABC – Associated Air Balance Council
3. AASHTO – American Association of State Highway and Transportation Officials
4. ACI - American Concrete Institute
5. ACOE - U.S. Army Corps of Engineers
6. ADA – Americans with Disabilities Act
7. ADC – Air Diffusion Council
8. AFBMA – Antifriction Bearing Manufacturers Association
9. AGA – American Gas Association
10. AGC – Associated General Contractors of America
11. AGMA - American Gear Manufacturer Association
12. AI – Asphalt Institute
13. AIA – American Institute of Architects
14. AISC – American Institute of Steel Construction
15. AISI - American Iron and Steel Institute
16. AITC - American Institute of Timber Construction
17. AMCA – Air Movement and Control Association
18. ANSI – American National Standards Institute
19. APA – American Plywood Association
20. API – American Petroleum Institute

21. ARI – Air Conditioning and Refrigeration Institute
22. ASCE – American Society of Civil Engineers
23. ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers
24. ASME – American Society of Mechanical Engineers
25. ASPA – American Sod Producers Association
26. ASTM – American Society for Testing and Materials
27. AWG – American Wire Gauge
28. AWI - Architectural Woodwork Institute
29. AWPA – American Wood Preservers' Association
30. AWS – American Welding Society
31. AWWA – American Water Works Association
32. BIA – Brick Institute of America
33. CDA – Copper Development Association
34. CLFMI – Chain Link Fence Manufacturer's Institute
35. CPM - Critical Path Method
36. CPVC – Chlorinated Polyvinyl Chloride
37. CRSI – Concrete Reinforcing Steel Institute
38. CI – Cast Iron
39. DEP - Massachusetts Department of Environmental Protection
40. DCAM - Division of Capital Asset Management
41. DHI – Door and Hardware Institute
42. DI – Ductile Iron
43. EJCDC – Engineers' Joint Contract Documents Committee
44. EJMA – Expansion Joint Manufacturers Association
45. EPDM – Ethylene Propylene Diene Monomer
46. EPT – Electrical Plastic Tubing
47. EVT – Equiviscous Temperature
48. FGMA - Flat Glass Marketing Association
49. FM – Factory Mutual
50. FS – Federal Specifications
51. GA – Gypsum Association

52. GFCI – Ground Fault Circuit Intempter
53. GPR - Ground Penetrating Radar
54. GPS – Global Positioning System
55. HVAC – Heating, Ventilating and Air Conditioning
56. IBC – International Building Code
57. IBR – Institute of Boiler and Radiator Manufacturers
58. ICBO – International Conference of Building Officials
59. ICS – Industrial Control and Systems
60. IEEE – Institute of Electrical and Electronics Engineers
61. IMI – International Masonry Institute
62. ISA – Instrument Society of America
63. JIC – Joint Industrial Council
64. LCD – Liquid Crystal Display
65. MADEP – Massachusetts Department of Environmental Protection
66. MBMA – Metal Building Manufacturer's Association
67. MEC – Massachusetts Electric Code
68. MFMA Maple Flooring Manufacturers Association
69. MGL – Massachusetts General Law
70. ML/SFA – Metal Lath/Steel Framing Association
71. MSDS – Material Safety Data Sheets
72. MSS – Manufacturer's Standardization Society
73. NAAMM – National Association of Architectural Metal Manufacturers
74. NAVD – North American Vertical Datum
75. NCMA – National Concrete Masonry Association
76. NEBB – National Environmental Balancing Bureau
77. NEC – National Electrical Code
78. NECA – National Electrical Contractors Association
79. NEMA – National Electrical Manufacturers Association
80. NFPA – National Fire Protection Association
81. NRCA – National Roofing Contractors Association
82. NRS – Non-rising Stem

83. NSF – National Sanitation Foundation
84. NSWMA – National Solid Waste Management Association
85. NWMA – National Woodwork Manufacturers Association
86. O&M – Operation and Maintenance
87. OSHA – Occupational Safety and Health Administration
88. PCA – Portland Cement Association
89. PCI – Precast/Prestressed Concrete Institute
90. PDOP – Positional Dilution of Precision
91. PLC – Programmable Logic Controller
92. PS – Product Standard
93. PVC – Polyvinyl Chloride
94. QA/QC – Quality Assurance/Quality Control
95. RCP – Reinforced Concrete Pipe
96. RCSHSB – Red Cedar Shingle and Handsplit Shake Bureau
97. RIS – Redwood Inspection Service
98. RTU – Remote Telemetry Unit
99. SCADA – Supervisory Control and Data Acquisition
100. SDI – Steel Deck Institute
101. TCA – Tile Council of America
102. UL – Underwriter's Laboratories
103. UPS – Uninterruptable Power Supply
104. USCS – Unified Soil Classification System
105. USDA – United States Department of Agriculture
106. WCLIB – West Coast Lumber Inspection Bureau
107. WOG – Water, Oil, Gas
108. WWPA – Western Wood Products Association

END OF SECTION

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SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Temporary electricity
2. Temporary lighting for construction purposes
3. Temporary heating, cooling and ventilation
4. Temporary telephone service
5. Temporary water service
6. Temporary fire protection
7. Temporary fuel oil

1.2 QUALITY ASSURANCE

A. Maintain temporary utilities in proper and safe condition throughout the progress of the Work.

1.3 TEMPORARY ELECTRICITY

A. In case the of shutdowns, provide and pay all charges for temporary electrical service capable of providing sufficient power throughout the site for both temporary power and temporary lighting for any electrical requirements. Temporary electrical service shall consist of all wiring, breakers, breaker boxes, poles, supports and all other materials necessary for a totally operable system. The following shall apply:

1. Make all arrangements with the electric service company including all permits, securities and inspections fees to obtain the separately metered temporary services.
2. Furnish and connect the temporary electric service point to the utility and coordinate metering as required.
3. All connection points and distribution systems shall be in conformance with applicable electrical codes, OSHA, and enforcement agencies having jurisdiction.
4. Provide a general power distribution system including all wires, cables, supports, protective devices, transformers, motor starters, etc., as required for a complete electrically protected and safe system to handle construction services.
5. Provide all outlets with circuit breaker protection and comply with ground fault protection requirements of the NEC.

B. For short term electrical use, less than one (1) hour, the Owner's existing power service may be utilized and the following shall apply:

1. Provide necessary wiring and appurtenances to connect to the Owner's electric service point. Do not disrupt the Owner's use of service.

2. All connection points and distribution systems shall be in conformance with applicable electrical codes, OSHA, and enforcement agencies having jurisdiction.

3. Provide a general power distribution system including all wires, cables, supports, protective devices, transformers, motor starters, etc., as required for a complete electrically protected and safe system to handle construction services.

4. Provide all outlets with circuit breaker protection and comply with ground fault protection requirements of the NEC.

C. A portable power supply capable of providing sufficient power at the site for both temporary power and lighting throughout the project may be utilized for temporary power in accordance with the following:

1. Due to the potential risks of contamination from fuel spills, the use of all fuel-driven generator sets must be strictly controlled and monitored while on site.

2. Refueling must be accomplished off-site when feasible and if fuel is transported to the site, it must be in approved containers with secondary containment. All gasoline driven pumps or diesel generators shall be underlain by sheets of polyethylene plastic and on-site refueling shall be accomplished by pumping or siphoning. Absorbent pads shall be available for immediate use in the event of an accidental spill. The Contractor shall be responsible for complete cleanup of any accidental spills.

3. Maintain and service the portable power unit(s) throughout the duration of the project.

4. Provide a general power distribution system including all wires, cables, supports, protective devices, transformers, motor starters, etc., as required for a complete electrically protected and safe system to handle required construction services.

1.4 TEMPORARY LIGHTING

A. Temporary general lighting system shall provide sufficient artificial light so that all Work may be done in a workmanlike manner within enclosed structures and chambers, where there is not sufficient daylight. A minimum of 300 watts of lamp per each 200 square foot or less of work area shall be provided.

B. Temporary general lighting system shall consist of wiring, switches, necessary insulated supports, poles, fixtures, receptacles, lamps, guards, cut-outs, fuses, and other materials necessary for a totally operable system.

1.5 TEMPORARY HEATING, COOLING AND VENTILATING

A. Provide sufficient temporary heating, cooling and ventilating for the interior of all new structures and buildings to assure safe working conditions and that no damage will occur to the Work.

B. Systems shall be complete, including but not limited to, pumps, radiators, unit heaters, fans, ducts, piping, insulation, thermostat controls and other equipment necessary for a totally operable system.

C. Temporary heating, cooling and ventilating shall be capable of maintaining a minimum of 60°F and a maximum of 80°F, unless otherwise specified, simultaneously in all areas of construction in buildings and structures and shall be provided at all times when workmen are engaged in construction activity or if needed to protect Work or equipment previously installed.

D. Temporary heating systems shall be gas or electric, steam hot water or warm air type; or combination thereof. Salamanders or other direct oil or kerosene fired equipment will not be allowed.

E. Temporary heating, cooling and ventilating systems shall be located so as not to interfere with existing facilities or new construction work.

F. Prior to operation of permanent equipment for temporary heating, cooling or ventilating purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance and regular replacement of filters and worn or consumed parts. Replace fuel consumed during temporary heating using permanent equipment prior to final completion of the Work.

G. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity and to prevent accumulation of dust, fumes, vapors or gases.

1.6 TEMPORARY WATER SERVICE

A. Temporary Drinking Water

1. Provide adequate potable drinking water, so piped or transported as to keep it safe and fresh, and served from single service containers or satisfactory types of sanitary drinking stands or fountains.

2. Provide all such facilities and services in strict accordance with existing and governing health regulations.

B. Water for Construction Purposes

1. Owner will provide all water for construction purposes to Contractor without charge for this project. The Owner shall not be responsible for delivery of water at a rate other than is feasible with the Owner's existing water service facilities located at each site. All required modifications to this system shall be at the Contractor's expense.

2. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

1.7 TEMPORARY FIRE PROTECTION

A. Comply with all applicable fire protection and prevention requirements that may be established by Federal, State or local governmental agencies.

B. Prohibit smoking in hazardous areas. Post suitable warning signs in areas that are continuously or intermittently hazardous.

C. Determine the fire protection adequacy of existing facilities related to the Work being performed and have standby fire protection available if needed.

1.8 TEMPORARY FUEL OIL

A. Properly contain, label, and store all petroleum products off the ground with suitable secondary containment.

B. Take all necessary precautions to avoid leakage and spillage of all petroleum products, including lubricating oils.

C. In general, perform fueling and refueling of all equipment and vehicles. In the event that on-site refueling is necessary and as approved by the Engineer, provide suitable secondary containment facilities to contain all potential spillage, including that resulting from over-filling.

D. Inspect vehicles for leaks prior to entrance to the Work site. Vehicles with leaks are prohibited from entering the Work site. All vehicles, while on the work site, shall be within an area provided with secondary containment. Absorbent pads must be available on site for immediate use if needed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01520

CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Temporary sanitary and first-aid facilities

1.2 QUALITY ASSURANCE

A. Maintain temporary construction facilities in proper and safe condition throughout the progress of the Work.

1.3 TEMPORARY SANITARY AND FIRST AID FACILITIES

A. Provide suitably enclosed chemical or self-contained toilets for the use of the labor force employed on the Work. Toilets shall be located near the Work sites and secluded from observation insofar as possible. Toilets shall be serviced weekly, kept clean and supplied throughout the course of the Work.

B. Contractor shall enforce proper use of sanitary facilities.

C. Use of the Owner's sanitary facilities by the Contractor is prohibited.

D. Provide a first aid station at the site.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01580

TEMPORARY BYPASS PUMPING SYSTEM - WASTEWATER

PART 1 GENERAL

1.1 SUMMARY

A. In the case that any pump station is required to be shut down by Contractor or Subcontractors, which prevents normal pump station operation, a temporary bypass pumping system shall be provided at no cost to the Owner.

B. Exterior bypass piping is located at the Conant Road and Brook Street pump stations.

C. Section Includes

1. Temporary bypass pumping

1.2 SUBMITTALS

A. Informational Submittals

1. Submit a specific, detailed description of the proposed bypassed pumping system.

2. Submit references for prior projects.

3. Submit qualifications of bypass pumping company.

4. Submit detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in the Contract Documents. No construction shall begin until all provisions and requirements have been approved.

5. Submit hydraulic calculations and drawings stamped by a Massachusetts Registered Professional Engineer.

6. The drawings shall include but not be limited to details of the following:

a. Staging areas for pumps

b. Sewer plugging method and types of plugs

c. Number, size, material, location and method of installation of suction piping

d. Number, size, material, method of installation and location of installation of discharge piping

e. Bypass pump sizes, capacity, number of each, and size to be on site and fuel/power requirements

f. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted)

g. System curve with suction lift performance

h. Standby power generator size, location

i. Downstream discharge plan

j. Method of protecting discharge manholes or structures from erosion and damage

k. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill

l. Method of noise control for each pump and/or generator

m. Any temporary pipe supports and anchoring required

n. Design plans and computation for access to bypass pumping locations indicated on the drawings

o. Calculations for selection of bypass pumping pipe size

p. Schedule for installation of and maintenance of bypass pumping lines

q. A plan showing the location of bypass pumping equipment, and suction and discharge piping

1.3 QUALITY ASSURANCE

A. Employ the services of a company that specializes in the design and operation of temporary bypass pumping systems. Demonstrate that the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator.

B. Provide at least 5 references of projects of similar size and complexity in wastewater applications performed within the past three years within New England.

C. The bypass pumping company shall have a minimum experience of 15 years designing and supplying wastewater bypass systems.

D. Demonstrate sufficient inventory to perform normal rentals, including this project, and maintain at least 100% reserve equipment for this project for immediate delivery.

E. Demonstrate sufficient service and repair parts in stock to fulfill any service or repair of all rental equipment within 3 hours of any service call.

F. Demonstrate sufficient service staff and trucks to mobilize to repair or service equipment within 1 hour of a service call, 24 hours per day, 7 days per week.

G. Provide a list of cell phone and pager numbers to call for twenty-four hour service.

H. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

I. Obtain required approvals for placement of the temporary pumping equipment and piping system adjacent to the existing sewer main or influent channels.

J. No construction shall begin until the related project submittals are approved and all provisions of the work have been coordinated with the Owner and Engineer.

1.4 SYSTEM REQUIREMENTS

A. Design, install, operate, and subsequently remove a temporary bypass pumping system to divert the existing sewage flow around the work area for the duration of the project in which it is required to do the work. Temporary diversion facilities may be required in the following areas:

1. Conant Road Pump Station Influent Wet Well and Influent Channel
2. Brook Street Pump Station Influent Wet Well and Influent Channel
3. Sycamore Road Pump Station
4. Stevens Farm Road Pump Station
5. Arcadia Road Pump Station

B. Be responsible for temporary controls required to prevent intrusion of sewage into the construction area during installation of the pumping equipment, the installation of discharge line check valve, and the installation of the sluice gates.

C. Bypass pumping equipment shall be automated and capable of functioning without the assistance of an operator.

D. Pumping equipment shall be capable of operating for an extended period of time running dry. After this period of time, the pump shall have the capability of pulling a 25 inch Hg vacuum without adjustment or repair.

E. The entire bypass system including all pumps, pipe, hose, valves, and fittings shall be provided by one bypass pumping company who is responsible for the operation of the entire system.

F. Controls shall be provided to operate pump(s) as required based on liquid level in the structure(s) where suction piping is located. A high level alarm shall be provided. Alarm shall notify personnel of a high level in the structure(s) and shall require immediate response by the contractor to determine the cause and implement measures to ensure pumping is at the maximum specified rate. A pump failure alarm shall also be provided. Both alarms shall be capable of notifying the Contractor and the Owner's Representative via telephone. Contractor shall respond within 1 hour of the alarm.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Pumps shall be centrifugal, end suction, fully automatic self-priming low noise pumps that do not require the use of foot-valves, vacuum pumps, diaphragm pumps, or isolation valves in the priming system. Pumps must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flow pumps and shall immediately develop 25 inch Hg vacuum without adjustment or repair or employ level control devices to regulate on/off or variable speed of the pump. Hydraulic, submersible, electric, or wellpoint type pumps are prohibited. Pumps shall be low noise sound attenuated, critically silenced units.

B. Seals shall be high pressure, mechanical self-adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for extended periods of time. All metal parts shall be of stainless steel. Elastomers shall be Viton. Pump end shall be manufactured to meet ISO 9002 certifications.

C. The primary pumps shall be electric powered via a temporary electrical service. Temporary electrical service to be provided and paid for by the Contractor at no expense to the Owner.

D. Back-up pumps and/or standby electric generator system may be fossil fuel engine driven.

E. Provide the necessary start/stop controls for each pump.

F. Include one stand-by pump of each size to be maintained on site and a standby power source.

G. Back-up pumps shall be on-line, isolated from the primary system by a valve.

H. Pump shall not be connected by a common suction manifold. The use of PVC or Steel Pipe with Dresser Couplings will not be accepted. All pipe or hose will be rated for 25 inch Hg Vacuum.

I. To prevent the accidental spillage of flows, all discharge systems must be constructed of high density polyethylene pipe with fused joints or quick disconnect pipe with positive restrained joints, and leak proof connections. Discharge hose will only be allowed by specific permission of the engineer. PVC pipe with glued joints, aluminum “irrigation pipe”, steel pipe or PVC pipe with Dresser couplings will not be accepted. All joints must be 100% restrained. All discharge pipe must have a minimum working pressure of 50 psi. All force main connections shall be made by using flanged composite hose with a working pressure of 150 psi.

J. Allowable piping materials will be fused, high density polyethylene pipe, acceptable disconnect pipe, or flanged composite pressure class hose. SDR of discharge piping shall be suitable for the calculated discharge pressures. The vendor fusing the pipe must have a minimum of 5 years experience fusing HDPE pipe of the same diameter required for the project.

2.2 SYSTEM DESCRIPTION

A. Design Requirements:

1. Bypass pumping systems shall have sufficient capacity to pump a peak flow of 1800 gpm in the Conant Road pump station and 1425 gpm in the Brook Street Pump Station. Bypass pumping systems shall have sufficient capacity to pump a peak flow equal to the capacity of the existing gravity sewer main. Bypass pumping systems shall have sufficient capacity to pump a peak flow equal to the pumping capacity of the existing/proposed pump station.

2. Provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired. Bypass pumping systems will be required to be operated 24 hours per day.

3. Have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure. Also, a back-up power supply source shall be provided.

4. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performance of work.

5. Make all arrangements for bypass pumping during the time when the pump station is shut down for any reason. System must overcome any line pressure on discharge.

B. Performance Requirements:

1. There must be no interruption in the flow of sewage throughout the duration of the Project. Provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with the Work, carry it past the Work and return it to the existing influent channel, wet well tank, or sewer downstream of this work.

2. Provide all necessary means to safely convey the sewage past the work area. The Contractor will not be permitted to stop or impede the main flows under any circumstances.

3. Maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.

4. The bypass system shall not require excavation to reduce the suction lift without the specific approval of the engineer prior to the bid.

5. Protect water resources, wetlands, and other natural resources in accordance with the appropriate project permits.

6. Meet noise limits of 69dbA @ 30 feet. All diesel driven standby pumps and/or back-up power supplies shall be sound attenuated. The use of Critical

Silenced Canopy pumps or acoustical enclosures for sound attenuation is required.

7. The pumps shall not be benched down to make the suction lift unless approved by the Engineer prior to Bid.

PART 3 EXECUTION

3.1 PREPARATION

A. Precautions

1. Locating existing utilities in the area where the Contractor selects to locate the bypass pipelines. Locate bypass pipelines to minimize any disturbances to existing utilities and obtain approval of the pipeline locations from the Owner and Engineer. Pay all costs associated with relocating utilities and obtaining all approvals.

2. During all bypass pumping operation, protect the existing sewer lines, pump station, force main, and all gravity sewer lines from damage inflicted by any equipment. Be responsible for all physical damage to the existing facilities caused by human or mechanical failure.

3.2 FIELD QUALITY CONTROL AND MAINTENANCE

A. Test:

1. Perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. Give the Engineer 24 hour notice prior to testing.

B. Inspection:

1. Inspect the bypass pumping system regularly (every 2 hours) to ensure that the system is working correctly.

C. Maintenance Service:

1. Ensure that the temporary pumping system is properly maintained and a responsible operator is on hand at all times when pumps are operating.

D. Extra Materials:

1. Keep spare parts for pumps and piping on site as required.

2. Maintain adequate hoisting equipment for each pump and accessories on the site.

E. INSTALLATION AND REMOVAL

1. Make connections to the existing sewer or pump stations' influent channel and construct temporary bypass pumping structures only at locations approved by Owner and Engineer.

2. Make connections to the existing sewer and construct temporary bypass pumping structures only at locations approved by the submittals.

3. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

4. The pipeline must not interfere with Owner's access to any part of the pump station. Adhere to any and all applicable project permits.

5. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Engineer, remove all the piping, restore all structures, pipelines and property to pre-construction condition, and restore all pavement or concrete surfaces. Adhere to any and all applicable project permits.

END OF SECTION

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SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Products and Materials
2. Product Delivery Requirements
3. Packaging, Handling and Storage Requirements
4. Inspection of Offsite Work

1.2 QUALITY ASSURANCE

A. Review all contract Drawings and Specifications with respect to specific system characteristics, applicability of materials and equipment for the intended purposes, sizes, orientation, and interface with other systems, both existing and proposed, and certify that the materials and equipment proposed will perform as specified prior to submitting shop drawings.

B. Provide sworn certificates as to quality and quantity of materials where specified or requested by the Engineer.

C. Obtain concurrence of the Engineer prior to processing, fabricating, or delivering material or equipment.

1.3 PRODUCTS AND MATERIALS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by a single manufacturer unless specified otherwise.

B. Use only new and first quality material in the Work. Material shall conform to the requirements of these Specifications and be approved by the Engineer. If, after trial, it is found that sources of supply that have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved materials from other approved sources.

C. Immediately remove defective materials and equipment from the site, at no additional cost to the Owner. The Contractor may be required to furnish sworn certificates as to the quality and quantity of materials before materials are incorporated in the Work.

D. Engineer has the right to approve the source of supply of all material prior to delivery.

1.4 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

D. Progressively deliver materials and equipment to the Site so there will be neither delay in progress of the Work nor an accumulation of material that is not to be used within a reasonable time.

E. Deliver products to the Site in their manufacturer's original container, with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.

2. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to the manufacturer, grade, quality, source, and other pertinent information.

1.5 PACKAGING, HANDLING AND STORAGE REQUIREMENTS

A. Provide storage and handling of all materials and equipment required for the Work.

B. Except as otherwise indicated in the Contract Documents, determine and comply with the manufacturer's recommendations on product storage, handling, and protection. Provide manufacturer's documentation on recommended storage procedures when requested by the Engineer.

C. Properly store and protect all equipment immediately upon its arrival. All equipment shall be stored in a clean, dry, heated, secured, and insured indoor facility satisfactory to the Engineer. Equip drive motors with thermostatically controlled strip heaters. Outdoor storage with plastic, canvas, plywood or other cover will not be allowed except where specific approval for designated items not containing electrical components or bearings is obtained from the Engineer. This approval does not relieve the Contractor of responsibility for proper protection of materials.

D. Familiarize workmen and subcontractors with hazards associated with materials, equipment, and chemicals specified herein and take all necessary safety precautions.

E. Areas available on the construction site for storage of material and equipment shall be as shown on the Drawings or approved by the Owner.

F. Materials and equipment to be incorporated in the Work shall be handled and stored by the manufacturer, fabricator, supplier, and Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind to the material or equipment.

G. Protect finished surfaces including floor surfaces, stairs, joints, and soffits of passageways from damage until accepted by the Engineer.

H. Promptly remove materials from the site of the Work which have become damaged or are unfit for the use intended or specified. The Contractor will not be compensated for the damaged materials or their removal costs.

I. Handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required. Provide suitable and adequate storage room for materials and equipment during the progress of the Work, and be

responsible for the protection, loss of, or damage to materials and equipment furnished, until the final completion and acceptance of the Work.

J. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

K. All materials and equipment to be incorporated in the Work shall be placed so as to not damage any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Keep materials and equipment neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to the Owner.

L. No material or equipment will be permitted to be stored in any of the Owner's facilities, unless otherwise approved by the Engineer.

M. Do not store material or equipment in any wetland or environmentally sensitive area. Stockpile sites shall be level, devoid of mature stands of natural vegetation, and removed from drainage facilities and features, wetlands, and stream corridors.

N. Contractor shall be fully responsible for loss or damage to stored materials and equipment.

O. No item judged rusty, corroded or otherwise damaged during storage will be accepted. Any electrical or instrumentation item determined by the Engineer to be damaged shall be removed from the Site and replaced by a completely new item in first class condition. Items not properly stored will not be considered for any partial payment.

P. Provide protective and preventive maintenance during storage consisting of manually exercising equipment where required, inspecting mechanical surfaces for signs of corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer as necessary for its protection and other precautions as necessary to assure proper protection of equipment stored.

Q. Treat ferrous surfaces not receiving finish coats of paint with rust preventive coating, and protect non-ferrous metal work and devices with suitable wrappings.

1.6 INSPECTION OF OFFSITE WORK

A. The Owner and Engineer will inspect Work performed away from the construction site during fabrication, manufacture, or testing, or before shipment. Give 2 weeks written notice regarding the place and time where such fabrication, manufacture, testing, or shipping will be done.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01630

PRODUCT SUBSTITUTION DURING CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Product substitution procedures

1.2 CONTRACTOR'S OPTIONS

A. For materials or equipment (hereinafter products) specified only by performance or reference standard, select product meeting that standard, by any Supplier. To the maximum extent possible, provide products of the same generic kind from a single source.

B. For products specified by naming several products or manufacturers, select any one of the products or Suppliers named, which fully complies with the Drawings and Specifications. Another “or-equal” product can also be considered by the Engineer if it complies with the provisions of Article 7.04, Section 00700. If a product proposed by the Contractor does not qualify as an “or-equal” item, then it can be considered as a proposed substitute item, and the Contractor must comply with the requirements of Article 7.05, Section 00700.

C. For products specified by naming products or manufacturers and followed by words indicating that no “or-equal” item or substitution is permitted, there is no option and no substitution will be allowed.

D. Where more than one choice is available as a Contractor's option, select product that is compatible with other products already selected or specified.

1.3 SUBSTITUTIONS

A. If in the Engineer’s sole discretion a product proposed by the Contractor does not qualify as an “or-equal” item under the provisions of Article 7.04 of Section 00700, it can be considered a proposed substitute item. Submit information required under Article 7.05, Section 00700 for proposed substitutes.

B. The Engineer will consider written requests from the Contractor for substitutions within 30 days after the Notice to Proceed. After this period, requests will be considered only in case of unavailability of product or other conditions beyond control of the Contractor.

C. Submit 5 copies of request for substitutions. Submit a separate request for each proposed substitution. In addition to the submittal requirements outlined in Article 7.05 of Section 00700, include the following in each substitution request:

1. For products or Suppliers:

a. Product identification, including Supplier & manufacturer's name and address.

b. Manufacturer's literature with product description, performance and test data, and reference standards.

c. Samples, if appropriate.

d. Name and address of similar projects on which product was used, and date of installation.

2. For construction methods (if specified):

a. Detailed description of proposed method.

b. Drawings illustrating method.

3. Such other data as the Engineer may require to establish that the proposed substitution is equal to the product, Supplier or method specified.

D. The substitution request shall include written certification and statements that are outlined in Article 7.05 of Section 00700.

E. A request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.

2. Will provide same or better guarantees, warranties or bonds for proposed substitution as for specified product.

3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

4. Waives all claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.

F. A proposed substitution will not be accepted if:

1. Acceptance will require changes in the design concept or a substantial revision of the Contract Documents.

2. It will delay completion of the Work.

3. It is intended or implied on a Shop Drawing and is not accompanied by a formal request for substitution from the Contractor.

G. The Contractor is responsible for all costs relating to substitution requests.

H. Approval of a substitution does not relieve the Contractor from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01725

PRESERVATION AND RESTORATION OF PROJECT FEATURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Protection and replacement of trees, shrubs, signs, property markers, fences, and related project features.

2. Taking precautions, providing programs, and taking actions necessary to protect public and private property and facilities from damage.

1.2 DEFINITIONS

A. Underground Structures

1. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels and other existing subsurface work located within or adjacent to the limits of the Work.

2. Underground structures known to the Engineer are shown on the Drawings to the extent that locations are available. This information is shown for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete. The Contractor shall be responsible for checking on the actual locations of water, sewer, gas electric and telephone service connection lines to avoid potential interferences.

B. Surface Structures

1. Surface structures are defined as existing buildings, structures and other facilities above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 REPAIR/RESTORATION

A. Trees, shrubs, and similar items shall not be removed. Items to be removed shall be clearly marked as directed by the Engineer. If objects not to be removed are damaged or removed, they shall be repaired or replaced to their original condition.

B. Trees and shrubs on private property, which are removed or damaged by the Contractor shall be replaced in kind.

C. Signs, fences, property markers, walls, guard rails and other public or private property shall be replaced in kind if damaged. Supports and protective devices required shall be provided.

D. Underground and Surface Structures

1. In the event of damage, injury or loss to existing utilities and structures that were not indicated to be removed or abandoned, whether shown on the Drawings or not, make all reasonable efforts to facilitate repairs and to mitigate the impact of such events upon the utility or structure owner's normal operations. Restore the existing utility or structure to the condition required by the owner of the utility or structure or at least to the condition found immediately prior to the Work. In the event that the utility owner elects to make the repairs, provide all reasonable access and assistance, and reimburse the utility owner for the cost of repairs. If utility service is interrupted due to damage to facilities, alternate facilities shall be provided.

2. All other existing surface facilities, including but not limited to, guard rails, posts, guard cables, signs, poles, markers and curbs which are temporarily removed to facilitate the Work shall be replaced and restored to their original condition at the Contractor's expense unless otherwise indicated in other sections of these specifications.

3. Wherever water, sewer, gas or petroleum mains, electric or telephone lines, cables or other utilities and structures are encountered and may be in any way interfered with, inform the Engineer and the appropriate utility company. Cooperate with the Engineer and utility company in the protection, removal, relocation, and replacement of structures and facilities.

4. Prior to proceeding with any demolition or construction, notify in writing owners of utilities and structures within the vicinity of the proposed Work.

5. Work affecting water distribution systems, which will take fire hydrants out of service, must be coordinated with the local fire department. The Contractor shall be prepared to restore fire flows in the event of an emergency or to provide for temporary fire flow service in accordance with the requirements of the local fire department.

6. Materials used for relocation or replacement of utilities and structures shall be of an equivalent material, type, class, grade and construction as the existing or as approved by the respective owners thereof, unless otherwise shown or specified.

7. When any survey monument or property marker, whether of stone, concrete, wood or metal, is in the line of any trench or other demolition or construction work and may have to be removed, notify the Engineer in advance of removal. Under no circumstances shall any monument or marker be removed or disturbed by the Contractor or by any of his Subcontractors, employees or agents, without the permission of the Engineer. Monuments or markers removed or disturbed shall be reset by a land surveyor licensed in the State where the Work is located at the Contractor's expense. Should any monuments or markers be destroyed through accident, neglect or as a result of

the Work under this Contract, the Contractor shall, at his own expense, employ a land surveyor licensed in the State where the Work is located to re-establish the monument or marker.

3.2 PROTECTION

A. Underground and Surface Structures

1. Sustain in their places and protect from direct or indirect injury underground and surface structures designated to remain within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure. Before proceeding with the work of sustaining and supporting such structure, satisfy the Engineer that the methods and procedures to be used have been approved by the party owning same.

2. Pay utility service company charges related to the temporary support of utility poles if required to complete the Work.

3. Assume risks associated with the presence of underground and surface structures within or adjacent to the limits of the Work. The Contractor shall be responsible for damage and expense for direct or indirect injury caused by his Work to any structure. Immediately repair damage caused by the Work to the satisfaction of the owner of the damaged structure.

END OF SECTION

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SECTION 01770

CLOSEOUT PROCEDURES

1.1 SUMMARY

A. Section Includes

1. Documentation required for the transfer of the completed Work to the Owner
2. Final Cleaning

1.2 SUBMITTALS

A. Closeout Submittals

1. As-built drawings
2. Operation and maintenance manuals
3. Evidence of payment and release of liens
4. List of Subcontractors, service organizations, and principal vendors

1.3 SUBSTANTIAL COMPLETION

A. Refer to Article 14.04 in 00700, General Conditions, for procedures relating to obtaining Substantial Completion. Refer to 00520, Agreement, for Contract times.

1.4 PROJECT CLOSEOUT DOCUMENTS

A. As-built Drawings - Submit as-built drawings review, approval, or comment. The as-built drawings shall show the completed work, including all deviations from the Drawings. The as-built drawings shall depict the location of all conduit and devices exterior from the motor control centers, the location of valves, small diameter piping, relocated devices and all field changes.

1. Take swing ties to all underground work from a minimum of two horizontal locations. Vertical dimensions to all below grade work shall also be obtained. Show all fittings, bends, valves and other appurtenances. At a minimum, the following information should be shown on the as-built drawings for exterior construction:

a. Ties to all buried fittings (including tees, crosses, bends, reducers, wyes, offsets, adapters, sleeves, caps, plugs), valves, services and structures from two horizontal measurements to permanent surface reference points, and depth below permanent grade. Permanent surface reference points are manholes, catch basins, power poles, and above-grade structures.

b. Ties to all surface structures (including manholes, catch basins, vaults, valve boxes, hydrants, curb stops, cleanouts, wet wells, outlets, etc.) from two horizontal measurements to permanent surface reference points.

c. Ties to other utility crossings and abandoned pipelines from two horizontal measurements to permanent surface reference points. Include depth below permanent grade and spacing between crossing utilities.

d. Invert and rim elevation of all gravity pipelines and structures including manholes, catch basins, below-grade structures, wet wells, septic tanks and distribution boxes as appropriate.

e. Change to pipe size and materials.

2. Locate all utilities and appurtenances concealed in construction. Provide detail not shown on Contract Documents. Use colored pencils or felt tipped pens to record all revisions to the as-built drawings. Use the following color code unless otherwise approved by the Engineer:

a. Process and Mechanical: Red

b. Architectural: Blue

c. Structural: Purple

d. Plumbing: Brown

e. HVAC: Green

f. Electrical: Orange

g. Other: Black

B. Operation and Maintenance manuals – Submit four copies of Operation and Maintenance Manuals for items listed in other sections of these Specifications and for other items when directed by the Engineer. Draft O&M Manuals shall be submitted at least 60 days prior to startup of the equipment.

1. Manuals shall be in three-ring binders and provided on CD or USB drive in PDF format. However, manuals which consist of 20 or fewer pages may be bound using three-hole, plastic, clear-front report covers.

2. Manuals shall include, as a minimum:

a. The Operations and Maintenance Manual Certification Form (copy attached at the end of this Section) which shall be attached to every copy of each Operations and Maintenance Manual submitted.

b. A comprehensive index broken down into sections and sub-sections

c. A complete list of the equipment supplied, including serial numbers, ranges, and pertinent data

d. Full specifications on each item

e. Detailed service, maintenance and operation instructions for each item supplied

f. System schematic drawings "as Constructed," illustrating all components, piping and electrical connections of the systems supplied under Division 16

g. Clearly defined special maintenance requirements particular to this system, along with special calibration and test procedures

h. Operating instructions with a functional description of the entire system, with references to the systems schematic drawings and instructions

i. Complete parts lists with stock numbers and name, address, and telephone number of the local supplier

j. A complete "As Constructed" set of approved shop drawings

k. The format of the O&M manual shall meet the following general requirements:

1) Complete, comprehensive index

2) Section with operating instructions including complete overview of the system

3) Section with a complete parts list as described above

4) Section that includes all schematic diagrams, wiring diagrams etc. of the "As Constructed System"

5) Product information

l. Section and sub-section dividers

m. Separate divider for each product

n. Data sheets indicating the tag names (as used on the Drawings), manufacturer, complete model number, complete specifications, and parameter setup sheet with the parameter setup sheets following the manufacturers O&M manual in its entirety

o. Final documentation written specifically for this project including standard and modified standard documentation, with modifications to existing hardware or software manuals made on the respective pages or inserted adjacent to the modified pages. All standard documentation furnished shall have all portions that apply clearly indicated, and all portions that do not apply shall be lined out.

p. All illustrations, detailed drawings, wiring diagrams, and instructions necessary for installing, operating, and maintaining the equipment, with illustrated parts numbered for identification and all information applying specifically to the equipment furnished and only including instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

C. Final Documentation – Submit the following final documentation:

1. As-Built documentation shall include all previous submittals, as described in this Specification, updated to reflect the as-built system.

2. The maintenance documentation shall describe the detailed preventative and corrective procedures required to keep the system in good operating condition. All hardware maintenance manuals shall make reference to appropriate diagnostics, where applicable, and all necessary timing diagrams shall be included. A maintenance manual or a set of manuals shall be furnished for all delivered hardware, including peripherals. The hardware maintenance documentation shall include, as a minimum, the following information:

   a. Operation information – This information shall include a detailed description of how the equipment operates and a block diagram illustrating each major assembly in the equipment.

   b. Preventative-maintenance instructions – These instructions shall include all applicable visual examinations, hardware testing and diagnostics routines, and the adjustments necessary for periodic preventative maintenance of the system.

   c. Corrective-maintenance instructions – These instructions shall include guides for locating malfunctions down to the card-replacement level. These guides shall include adequate details for quickly and efficiently locating the cause of an equipment malfunction and shall state the probable source(s) of trouble, the symptoms, probable cause, and instructions for remedying the malfunction.

   d. Parts information – This information shall include the identification of each replaceable or field-repairable module. All parts shall be identified on a list in a drawing; the identification shall be of a level of detail sufficient for procuring any repairable or replaceable part. Cross-references between the Contractor's part number and manufacturer's part numbers shall be provided. All PC boards shall be identified by; manufacturer and model number, slot number, part name and configuration (if applicable).

D. Provide warranties and bonds for items so listed in pertinent other sections of the Project Manual. Provide all warranties and bonds in a three-ring binder.

E. Provide keys and keying schedule, where applicable.

F. Provide evidence of compliance with requirements of governmental agencies having jurisdiction including:

   1. Certificates of Inspection.

   2. Certificates of Occupancy.

G. Provide evidence of payment and release of liens.

H. List of Subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.

I. Equipment start-up reports shall be submitted in duplicate to the Engineer for each piece of equipment installed. The report shall include detailed descriptions of the points inspected, tests, and adjustments made, quantitative results obtained and maintenance suggestions. The report shall certify that the equipment (1) has been satisfactorily installed and conforms to the Contract requirements; (2) is in accurate alignment and free from undue stress; (3) has been operated under full load and operates satisfactorily; and (4) nothing in the installation will render the manufacturer's warranty null and void. Equipment start-up reports shall be included in the appropriate equipment O&M manuals.

J. Provide records of all Owner training/instruction sessions conducted in accordance with paragraph 1.5 of this Section and as required in the project Specifications. The record for each training session shall include reference to the relevant specification section, a summary of the topics covered in the training session, and a sign-in sheet listing all attendees in attendance for the training.

K. Provide color charts, legends, instructions, special tools and other requirements specifically requested in sections of the Specification.

1.5 INSTRUCTION OF OWNER'S PERSONNEL

A. Provide instruction by qualified manufacturers' representatives in the proper operation, maintenance, adjustment and the safety aspects of the equipment and materials furnished. Specific instruction requirements may be included within the sections of the Specification.

1.6 FINAL CLEANING & REPAIRS

A. Complete cleaning prior to final inspection. Cleaning shall include all interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces. Thoroughly wipe clean all ductwork, piping, equipment, devices, and exposed surfaces. Clean debris from lawns, roofs, downspouts and gutters. Sweep paved surfaces and rake lawns and landscaped areas.

B. Use only cleaning materials that will not create hazards to health or property.

C. Remove and entirely dispose of material or debris that has washed, flowed or has been placed in existing watercourses, ditches, gutters, drains, pipe, or structures, for work done under the Contract work limits. Leave ditches, channels, drains, pipes, structures, and watercourses in a clean and neat condition upon completion of the Work.

D. On or before the completion of the Work, tear down and remove all temporary buildings and structures, remove all temporary works, tools, and machinery or other construction equipment, remove all rubbish from any grounds which has been occupied and leave the roads and all parts of the premises and adjacent property in a neat and satisfactory condition.

E. Restore or replace any public or private property damaged or removed during the course of the Work. Property shall be returned to a condition at least equal to that existing immediately prior to the beginning of operations. Complete all highway or driveway, walk, and landscaping work using suitable materials, equipment and

methods. Perform restoration of existing property, signs or structures promptly as work progresses; do not leave restoration work until the end of the Contract Time.

1.7 COMPLETION

A. The Contract shall be considered complete and final payment made, only when:

1. All provisions of the Contract Documents have been strictly adhered to.

2. All damage to adjoining areas caused by the Work has been repaired.

3. The project and premises have been left in good order, including removal of all temporary construction, Contractor-owned and extraneous materials as required.

4. All warranties, Operation and Maintenance Manuals, maintenance instructions, releases, and permits called for in the Contract have been submitted to the Owner and Engineer as applicable.

5. All as-built drawings as required by the Contract Documents have been submitted to the Owner.

6. All monies owed the Owner for services performed for the Contractor by Owner's forces in connection with the Contract have been paid.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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O&M MANUAL CERTIFICATION FORM

PROJECT:_____
ENGINEER:_____ ENGINEER'S PROJECT NO.:_____
CONTRACTOR:_____ CONTRACTOR'S PROJECT NO.:_____

TRANSMITTAL NO.:_____ SHOP DRAWING NO.:_____
SPECIFICATION NO.:_____ DRAWING NO:_____
DESCRIPTION:_____
MANUFACTURER:_____

The above referenced O&M manual has been reviewed by the undersigned and I/we certify that the manual is customized as needed for this project, and contains the following items, where applicable for the materials or equipment provided:

- ☐ 3-ring binder with title on binder and binding edge
- ☐ Electronic CD, when specified
- ☐ Comprehensive index broken down into sections
- ☐ Dividers for sections and sub-sections
- ☐ Warranties
- ☐ Troubleshooting information
- ☐ Startup, operation & shutdown procedures
- ☐ Safety procedures
- ☐ Manufacturer's contact information
- ☐ Complete parts list of equipment supplied
- ☐ Complete specifications/data on each item
- ☐ Detailed maintenance & operations instructions
- ☐ "As constructed" layout & schematic drawings
- ☐ Wiring diagrams
- ☐ Lubrication & maintenance schedules
- ☐ Equipment performance curves
- ☐ List of spare parts supplied and current cost
- ☐ Parts & service contact information

SUBMITTED BY:_____ DATE:_____

GENERAL CONTRACTOR'S STAMP

SECTION 02225

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Demolition includes work as shown on the Drawings.

B. Relocation of pipes, conduits, ducts, other mechanical and electrical work as necessary to complete work under this contract of all respective trades.

C. Coordinate with Subcontractors all demolition work which may affect subtrade work to verify the limits of the demolition work required.

1.2 RELATED SECTIONS

A. Section 01580 - Temporary Bypass Pumping System – Wastewater

B. Section 16091 – Minor Electrical Demolition

1.3 SUBMITTALS

A. Submit schedule of operations for selective demolition work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

1.4 JOB CONDITIONS

A. Conduct selective demolition work in a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of two (2) weeks advance notice to Owner of demolition activities which will impact Owner's normal operations.

B. The Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at the time of commencement of the contract will be maintained by the Owner insofar as practicable. However, variations within the structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

C. The Owner retains the right of first refusal for all items to be removed or demolished. Remaining items of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from the site as they are removed. Storage or sale of removed items on site will not be permitted.

D. The Owner shall take possession of the following items removed by the Contractor. Carefully remove, to retain the unit in working order.

1. Brook Street Pump Station Pump and Motor No. 1

E. Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

1. Provide protective measures as required to provide free and safe passage of Owner's personnel to and from occupied portions of the site.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

3. Protect from damage existing finish work that is to remain in place which will become exposed during demolition operations.

4. Protect floors with suitable coverings when necessary.

5. Remove protections at completion of work.

F. Promptly repair damages caused to adjacent facilities by demolition work at no additional cost to the Owner.

G. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

H. Do not close, block or otherwise obstruct roadways, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

I. Use of explosives will not be permitted.

J. Maintain existing utilities, keep in service, and protect against damage during demolition operations.

K. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

L. Perform electrical demolition in accordance with Section 16091. Coordinate de-energization with the Electrical Contractor.

1.5 REGULATORY REQUIREMENTS

A. Notify and obtain required approvals from all agencies having jurisdiction over demolition prior to starting work including, but not limited to Health, Building, Fire Departments and local, state and federal agencies.

B. Comply with all applicable federal, state, and local safety and health requirements regarding the demolition of structures.

C. Do not close or obstruct roadways, walks, or other facilities without written permission from Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing structure surfaces, equipment or surrounding properties which could be misconstrued as being damaged from selective demolition work. File with Engineer prior to starting work.

3.2 PREPARATION

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1. Cease operations and notify the Owner and the Engineer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

B. Cover and protect furniture, equipment and fixtures from soiling or damage when demolition work is performed in areas from which such items have not been removed.

C. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

D. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of the facility. Provide minimum of 2 weeks advance notice to Owner and Engineer if shut-down of service is necessary during change-over.

E. Provide temporary by-pass connections and pumping equipment in accordance with Specification Section 01580, Temporary Bypass Pumping System – Wastewater. The by-pass system shall be operated as necessary throughout the construction process, to maintain continuity of sewage transport. Provide minimum of 2 weeks advance notice to Owner and Engineer prior to initiating operation of the by-pass.

F. All overhead hazards, which are imminent dangers, shall be removed and/or stabilized prior to work commencing near any building. Where hazards are not readily accessible, Contractor shall mark and control areas below hazards to prohibit access below the hazards. This shall be performed with caution tape, saw horses, safety fence or other types of barricades as determined by applicable safety codes. Similarly, all holes through the floors or weak sections of the floor shall either be covered or clearly marked to prohibit entry. Floor coverings shall be capable of supporting heavy equipment use.

3.3 SELECTIVE DEMOLITION

A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

1. Demolish concrete in small sections. Cut concrete at junctures using power-driven saw or hand tools; do not use power-driven impact tools.

2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.

3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Engineer in written, accurate detail.

Pending receipt of directive from Engineer, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.4 DISPOSAL OF DEMOLITION MATERIAL

A. Remove debris, rubbish and other materials resulting from demolition operations from site. Transport and legally dispose of materials off-site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

2. Burning of removed materials is not permitted.

3.5 CLEAN-UP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

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SECTION 02740

BITUMINOUS CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Bituminous concrete paving, permanent, wearing, binder and base course.

B. Related Sections

1. Section 02315 - Excavation, Backfilling and Compaction
2. Section 02760 – Pavement Markings

1.2 REFERENCES

A. Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 Edition as amended.

B. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 1990 Edition, as amended.

C. ASTM D446 – Standard Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers

D. ASTM D2939 – Standard Test Methods for Emulsified Bitumens Used as Protective Coatings

E. AASHTO M 226

F. AASHTO T 96 – L.A. Abrasion Test

G. AASHTO T 195 (Ross Count)

H. TAI - (The Asphalt Institute) - MS-3 Asphalt Plant Manual.

I. TAI - (The Asphalt Institute) - MS-8 Asphalt Paving Manual.

1.3 SUBMITTALS

A. Product information and mix design for each mix specified under this Section.

B. Product data sheets for all additives proposed in the mix design.

C. Certificate indicating the mixes specified meet or exceed the requirements specified herein.

D. Certificate indicating the mix plant conforms to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with TAI Manual MS-8., Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

B. Mixing Plant: Conform to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

C. Obtain materials from same source throughout.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. Bituminous materials shall conform to the requirements of these Specifications.

2. Bitumen delivered to a project or to a mix plant must be accompanied by a proper certificate signed by the producer's authorized representative. Shipments of material not accompanied by a certificate will not be accepted for use in the work.

B. Bituminous Concrete Paving shall be Class I, Type I-1, as specified in Sections 460 and M3.11.0 of the above referenced Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.

TABLE 2

Specification Requirements for Asphalt Cement

Viscosity Graded at 140 °F

	Viscosity Grade							
	AC-5		AC-10		AC-20		AC-40	
Tests	Min	Max	Min	Max	Min	Max	Min	Max
Viscosity, 140 °F(60 °C), poises	500 ± 100		1000 ± 200		2000 ± 400		4000 ± 800	
Viscosity, 275 °F(135 °C), Cs	175		250		300		400	
Penetration, 77 °F (25°C), 100g, 5 Sec.	140		80		60		40	
Flash Point, COC, °F	350		425		450		450	
Solubility in trichloroethylene %	99.0		99.0		99.0		99.0	
Tests on Residue – Thin Film Oven Test Loss on Heating %		1.00		0.50		0.50		.050
Ductility, 60 °F (15.5 °C)5 cm/min. cm	100		40		20			
Ductility, 77 °F (25 °C)5 cm/min. cm	100		75		50		25	
Maximum viscosity, 140 °F (60 °C), poises		2000		4000		8000		16000

Ductility test temperature will be specified by the Engineer.

C. Bituminous Concrete

1. These mixtures shall be composed of mineral aggregate, mineral filler (if required), bituminous material, and reclaimed asphalt pavement (RAP). The use of RAP shall be at the Contractor's option unless otherwise provided by the special provisions of the contract.

2. Plants producing recycled mix shall be equipped so that they can properly proportion, blend and mix all components of a recycled mixture so that the end product is in conformance with the designated job-mix formula.

3. The mineral aggregate, filler (if required), bituminous material, asphalt modifier (if required) and RAP shall be proportioned and mixed to conform with the designated mixture as tabulated in Table A hereafter.

4. The composition limits in Table A are master ranges of tolerances of materials in general. In order to obtain standard texture, density and stability, the Contractor shall furnish to the Engineer a specific Job-Mix Formula for the particular uniform combination of materials and sources of supply to be used on each project. The Job-Mix Formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of bituminous material to be added to the aggregate and for batch plants, the number of seconds for dry mixing time and the number of seconds for wet mixing time. AASHTO T 195 (Ross Count) with a coating factor of 98% will be used when necessary to evaluate proper

mixing time. The Job-Mix Formula shall also specify a single source or uniform blend of particular sources for fine aggregate, a single source for each nominal size of coarse aggregate, a single source of supply for minor filler and sources for asphalt. The Job-Mix Formula shall bind the Contractor to furnish paving mixtures not only within the master ranges, but also conforming to the exact formula thus set up for the project, within allowable tolerances as follows:

For Table A Mixes

4.75 mm and larger sieve	±7.0%
2.36 mm and smaller sieves, except 75 μm	±4.0%
Passing 75 μm sieve	±2.0%
Asphalt	±0.4%

For Table B Mixes

4.75 mm and larger sieves	±5.0%
2.36 mm and smaller sieves, except 75 μm	±3.0%
Passing 75 μm sieve	±1.0%
Asphalt	±0.3%

TABLE A PERCENT BY MASS PASSING SIEVE DESIGNATION							
Standard Sieves	**Base Course**	**Binder Course**	**Dense Binder Course**	**Top Course**	**Modified Top Course**	**Dense Mix**	**Surf. Treat.**
50 mm	100						
25 mm	55-80	100	100		100		
19 mm		80-100	80-100		95-100		
16 mm				100			
12.5 mm	40-65	55-75	65-80	95-100	75-90	100	
9.5 mm				80-100	60-75	80-100	100
4.75 mm	20-45	28-50	48-65	50-76	40-60	55-80	80-100
2.36 mm	15-33	20-38	37-51	37-54	32-44	48-63	64-85
1.18 mm				26-40	24-34	36-49	46-68
600 µm	8-17	8-22	17-30	17-29	16-26	24-38	26-50
300 µm	4-12	5-15	10-22	10-21	8-18	14-27	13-31
150 µm*				5-16	4-13	6-18	7-17
75 µm	0-4	0-5	0-6	2-7	2-7	4-8	3-8
Bitumen	4-5	4.5-5.5	5-6	5.5-7.0	5.0-6.0	7-8	7-8

* Percentages shown in table above for aggregate sizes are stated as proportional percentages of total aggregate for the mix.

Unless authorized by the Engineer, no Job-Mix Formula will be approved which specified:
More than 45% passing 2.36 millimeter for Top Course and Dense Binder Course.
More than 38% passing 2.36 millimeter for Modified Top Course.
More than 55% passing 2.36 millimeter for Dense Mix.
Less than 4% passing 75 micrometer for Top Course.
Less than 6% bitumen for Top Course.

Should a change of sources of materials be made, a new job mix formula shall be established by the Contractor before the new material is used. When unsatisfactory results or other conditions make it necessary, the Engineer may establish a new Job-Mix Formula.

The aggregate will be accepted in stockpile at the plant site. The bituminous material will be accepted on certification.

If the Contractor elects to furnish bituminous concrete from more than one plant, the job mix formula must be adhered to by all plants.

5. The use of RAP will be permitted at the option of the Contractor and provided that the end product is in conformance with the designated Job-Mix Formula. The proportion of RAP to virgin aggregate shall be limited to a maximum of 40% for drum mix plants and 20% for modified batch plants. The maximum amount of RAP for surface courses shall be 10% except no RAP will be allowed in the open graded friction course (OGFC).

6. Two or more Job-Mix Formulas may be approved for a particular plant; however, only material conforming to one Job-Mix Formula will be permitted to be used on any given calendar day. The Job-Mix Formula shall bind the Contractor to furnish paving mixtures not only within the master ranges, but also conforming to the exact formula thus set up for the project.

7. Coarse Aggregate

   a. The coarse mineral aggregate shall be clean, crushed rock consisting of the angular fragments obtained by breaking and crushing shattered natural rock, free from a detrimental quantity of thin or elongated pieces, free from dirt or other objectionable materials, and shall have a percentage of wear, as determined by the Los Angeles Abrasion Test (AASHTO T 96), of not more than 30. It shall be surface dry and

shall have a moisture content of not more than 0.5% after drying. The use of crushed gravel stone will not be permitted.

8. Fine Aggregate

a. The fine aggregate shall consist of one of the following:

1) 100% Natural Sand

2) 100% Stone Sand

3) A blend of sand and stone screenings the proportions of which shall be approved by the Engineer

4) A blend of natural sand and stone sand

b. Natural sand shall consist of inert, hard, durable grains of quartz or other hard, durable rock, free from topsoil or clay, surface coatings, organic matter or other deleterious materials. When the primary source of material, passing the 75 μm sieve, is obtained from natural sand, these fines must be approved prior to use.

c. Stone sand shall be a processed material prepared from stone screenings to produce a consistently graded material conforming to specification requirements.

d. The stone screenings shall be the product of a secondary crusher and shall be free from dirt, clay, organic matter, excess fines or other deleterious material.

e. The fine aggregate as delivered to the mixer shall meet the following requirements:

	Percent Passing	
Sieve Designation	Minimum	Maximum
9.5 mm	95	100
2.36 mm	70	95
300 μm	20	40
75 μm	2	16

f. In the fine aggregate sieve analysis (passing 2.36 millimeters), the amount between two successive sieves (1.18 mm, 0.670 mm, 300 μm and 150 μm) shall not exceed 33% of the fine aggregate total.

g. Plants that experience a large variation in the quality and gradation of their primary fine aggregate sources and have difficulty in consistently providing fine aggregate that conforms to the requirements of this specification, shall be equipped with an approved fine aggregate system for processing fine aggregate that *will* meet the requirements of this specification.

D. Reclaimed Asphalt Pavement (RAP)

1. Reclaimed Asphalt Pavement (RAP) shall consist of the material obtained from highways or streets by crushing, milling or planing existing pavements.

This material shall be transported to the mix plant yard and processed through an approved crusher so that the resulting material will contain no particles larger than 38 millimeters. The material shall be stockpiled on a free draining base and kept separate from the other aggregates. The material contained in the stockpiles shall have a reasonably uniform gradation from fine to coarse and shall not be contaminated by foreign materials.

E. Processed Glass Aggregate (PGA)

1. The use of Processed Glass Aggregate (PGA) meeting the requirements of M2.01.8 may be added at a maximum addition rate of 10% mass. This addition will only be allowed in base and binder bituminous concrete mixtures. PGA in mixes containing reclaimed asphalt pavement (RAP) will be considered as part of the overall allowable mass of RAP in the mix. If PGA is used in the mix a separate aggregate bin shall be used and the use of lime as an anti-stripping agent will be required.

F. Mineral Filler

1. Mineral filler shall consist of approved Portland Cement, limestone dust, hydrated lime, stone float or stone dust. Stone dust shall be produced from crushed ledge stone and shall be the product of a secondary crusher so processed as to deliver a product of uniform grading. Mineral filler shall completely pass a 300 micrometer sieve and at least 65% shall pass a 75 micrometer sieve.

G. Bituminous Materials

1. The asphalt cement for the mixture shall be the grade designated by the Engineer and shall conform to the requirements of M3.01.01. When required an approved anti-stripping additive conforming to M3.10.0 shall be added to the asphalt cement.

2. Bituminous material for the tack coat on the existing surface, where required and specified, shall be emulsified asphalt, grade RS-1 conforming to M3.03.0.

3. For any bituminous mixture containing RAP, submit in addition to the Job-Mix Formula, the amount and type of asphalt modifier to be added to the mixture to restore the asphalt properties of the RAP to a level that is reasonably consistent with the requirements of current specifications for new asphalt. The restored asphalt when recovered by the Abson Method from the recycled mixture shall have a minimum penetration at 25°C of 50 and a maximum absolute viscosity at 60°C of 800 pascal seconds.

4. Only asphalt cement, grades AC-5, AC-10, AC-20 or a blend thereof will be used as modifiers and shall meet the requirements of M3.01.0.

H. Joint and Crack Sealer, Asphaltic-Fiber: Material shall consist of a blend of asphalt cement (AC-20) and polyester fibers. The asphalt-fiber blend shall consist of 6% fiber mass to mass of asphalt.

PART 3 EXECUTION

3.1 PAVING – GENERAL

A. Install bituminous concrete pavement in accordance with [Section 460 of the Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended].

B. Place base course as soon as possible after the gravel base has been prepared, shaped and compacted.

C. Place and compact binder course and base course by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete.

D. Maintain pavement under this Contract during the guarantee period of one year and promptly (within 3 days of notice given by the Engineer) refill and repave areas which have settled or are otherwise unsatisfactory for traffic.

E. All pavement thicknesses referred to herein are compacted thicknesses. Place sufficient mix to ensure that the specified thickness of pavement occurs wherever called for.

F. In no case will pavement be placed until the gravel base is dry and compacted to at least 95% maximum density at optimum moisture content.

G. No mix shall be placed on wet or damp surfaces. When surface and ambient temperatures are 15°C and rising, use mix prepared and placed in accordance with the specified requirements of the mix hereinbefore designated as OGFC.

H. Regardless of any temperature requirements, no mix conforming to the requirements of these specifications shall be placed after October 31 or before May 1 of any year.

I. Furnish and spread calcium chloride on disturbed surfaces to control dust conditions.

J. The contact surfaces of curbings, castings, and other structures shall be painted with a tack coat prior to placement of paving.

K. Along curbs, structures and all other places not accessible with a roller, the paving mixture shall be thoroughly compacted with tampers. Such tampers shall not weigh less than 25 pounds and shall have a tamping face no more than 50 square inches in size. The surface of the mixture after compaction shall be smooth and true to the established line and grade.

L. When the air temperature falls below 50°F, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials and placing and compacting the mixtures.

M. No mixtures shall be placed when the air temperature is below 40°F, or when the material on which the mixtures are to be placed contains frost or has a surface temperature ENGINEER considers too low.

N. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the

period of time before opening to traffic may be extended at the discretion of the Engineer.

O. Existing drainage patterns shall not be altered by the new pavement construction unless otherwise shown on the Drawings.

P. Maintain binder course in a condition suitable for traffic throughout the construction period. Defects shall be repaired within 3 days of notification.

Q. Prepare the base course for placement of the binder course. The base course shall be regraded, placing additional bituminous concrete where settling has occurred, repairing the existing surface and replacing broken or damaged sections at no additional cost to the Owner. The base course surface shall be in all respects acceptable to the Engineer before the binder course is placed. The surface shall then be broom cleaned.

R. Following preparation of the base course, apply the tack coat at 0.10 gallons per square yard and place the binder course.

S. Following preparation of the binder course, apply the tack coat at 0.10 gallons per square yard and place the top course.

T. Apply joint adhesive to all longitudinal joints for proper adhesion of the new bituminous concrete pavement to the existing.

U. Pavement markings damaged during the course of the work shall be repaired in accordance with Section 02760.

V. Following all paving, the area along the edge of all pavement, sidewalks, berms, waterways, etc. shall be backed up with gravel, or loam and seed as required, so that it is flush with the adjacent paving. Whenever possible, the final surface of the backup material shall slope away from the surface edge to allow proper sheeting of runoff.

3.2 BITUMINOUS CONCRETE TRENCH PATCH

A. Prior to the start of trench excavation, saw cut the existing pavement in the vicinity of the trench so as to prevent damage to the paving outside the specified paylines and/or the requirements of construction.

B. All lateral trench repairs shall consist of the following:

1. The Contractor shall place Type 2E Excavatable Controlled Density Fill from a point 6 inches above the pipe to 6½ inches below the surface of the existing pavement.

2. The Excavatable Controlled Density Fill shall be allowed to cure 24 hours before continuing with the pavement repair. The trench shall be covered with approved steel plates to allow traffic to pass unimpeded. Plates shall be secured in place with pins or other approved methods.

3. The permanent bituminous concrete repair shall be completed the following day. The existing pavement shall be cut back a minimum of 12 inches beyond the edge of trench and excavated and removed to a depth of 6½ inches below the surface of the existing pavement. The cut edges of the

existing pavement shall be straight and neat utilizing a saw cut only. Cutting with jack hammers will not be allowed.

4. The edges of the existing pavement where the joints are to be formed shall be thoroughly coated with a bitumen emulsion to ensure adhesion between the two pavements.

5. A 3½ inch dense base course shall then be installed above the Controlled Density Fill, in accordance with Section 420 of the Massachusetts DPW "Standard Specifications For Highways and Bridges", 1988 edition, as amended.

6. Upon this dense base course, install permanent bituminous concrete in two lifts. The first lift shall be a 1½ inch binder course and the second lift shall be a 1½ inch top course, bringing the repaired trench surface to grade.

7. The finish course shall blend smoothly with the existing pavement and shall conform to the existing grade and not interfere with or alter the existing surface drainage.

8. In all cases, the Contractor's operations shall be scheduled so as to interfere as little as possible with traffic.

END OF SECTION

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SECTION 05500

MISCELLANEOUS METALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Galvanized steel base plates, fasteners and anchor bolts.
2. Fasteners for Miscellaneous Metals items.

B. Related Sections

1. Section 05050 – Welding.
2. Section 09900 – Painting.

1.2 REFERENCES

A. The Commonwealth of Massachusetts State Building Code, Sixth Edition

B. The Commonwealth of Massachusetts Architectural Access Board, 521 CMR

C. American Iron and Steel Institute (AISI), Stainless Steel Types

1. AISI Type 316 - Stainless Steel Bolts, Bars, Sheets and Shapes
2. AISI Type 316L - Stainless Steel Bars, Shapes, Plates and Pipe

D. American National Standards Institute (ANSI)

1. A14.3, Safety Requirements for Fixed Ladders

E. American Society for Testing and Materials (ASTM)

1. A27, Standard Specification for Steel Casting, Carbon, for General Application
2. A36, Standard Specification for Carbon Structural Steel
3. A47, Standard Specification for Ferritic Malleable Iron Castings
4. A48, Standard Specification for Gray Iron Castings
5. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
6. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
7. A143, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement
8. A148, Standard Specification for Steel Castings, High Strength, for Structural Purposes

9. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
10. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
11. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service
12. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
13. A276, Standard Specification for Stainless Steel Bars and Shapes
14. A283, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
15. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
16. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
17. A384, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
18. A385, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
19. A489, Standard Specification for Carbon Steel Lifting Eyes
20. A490, Standard Specification for Structural bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
21. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
22. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
23. A563, Standard Specification for Carbon and Alloy Steel Nuts
24. A568, Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
25. A572, Standard Specification for High-Strength Low Alloy Columbium-Vanadium Structural Steel
26. A606, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
27. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
28. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, and Alloy Steel Floor Plates
29. A992, Standard Specification for Steel for Use in Buildings

30. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

31. B210, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes

32. B221, Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

33. B241, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

34. B316, Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold Heading Wire and Rods

35. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube

36. F436, Standard Specification for Hardened Steel Washers

37. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

38. F594, Standard Specification for Stainless Steel Nuts

39. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

40. F959, Standard Specification for Compressible Washer–Type Direct Tension Indicators for Use with Structural Fasteners

41. F1554, Standard Specification for Anchor Bolts, Steel, 36-, 55-, and 105-ksi Yield Strength

42. F1852, Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

F. International Conference of Building Officials (ICBO): Evaluation Reports for Concrete and Masonry Anchors.

G. Occupational Safety and Health Administration (OSHA):

1. 29 CFR 1910.27, Fixed Ladders.

H. National Association of Architectural Metal Manufacturers (NAAMM):

1. ANSI MBG 531, Metal Bar Grating Manual.

2. ANSI MBG 532, Heavy-Duty Metal Bar Grating Manual.

3. Metal Stairs Manual.

I. Steel Structures Painting Council (SSPC)

J. The Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

1.3 SUBMITTALS

A. Product Data:

1. Concrete and Masonry Drilled Anchors:

a. Manufacturer's product descriptions.

b. Specific installation instructions, including drilled hole size, preparation, placement procedures, and instructions for safe handling of anchoring systems.

2. Bitumastic Troweling for Surfaces in Contact with Concrete.

3. Fasteners

B. Shop Drawings:

1. Detailed shop drawings, including erection drawings, for all metal fabrications, including welding and fastener information:

a. Submit for approval before fabrication.

b. Identify sizes of structural members, method of assembly, anchorage, and connection to other members.

2. Setting drawings, templates, and directions for the installation of anchor bolts, or other items to be installed by others.

C. Quality Control Submittals:

1. Concrete and Masonry Drilled Anchors:

a. Current test data or ICBO evaluation report.

b. Adhesive Anchor Installer Certification.

2. Hot-Dip Galvanizing:

a. Certificate of compliance, signed by the galvanizer, referencing the specific project, with a description of the material processed and the ASTM standard used for coating.

b. Certificate shall verify the level of pre-galvanizing cleaning and the minimum coating thickness achieved.

3. Welding: In accordance with the requirements of Section 05050.

4. Provide Certificates of Compliance on other materials as requested by the Engineer.

1.4 QUALITY ASSURANCE

A. Shop Assembly: Pre-assemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are familiar with the specified

requirements and the methods needed for proper performance of the work of this Section.

C. Qualifications for Welding Work: In accordance with the requirements of Section 05050.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and stack materials carefully to prevent deformation or damage.

B. Store materials carefully on substantial timbers and blocking, so arranged that materials will be free from earth and properly drained, preventing any splattering with dirt or accumulation of water or snow in or about materials.

C. Prevent accumulation of mud, dirt, or other foreign matter on materials. Any accumulation shall be completely removed prior to erection.

D. Protect painted, hot-dip galvanized, and other finishes from damage due to metal banding and rough handling. Use padded slings and straps.

E. Adhesive Anchor Systems:

1. Store adhesive cartridges on pallets or shelving in covered storage area, in accordance with manufacturer's written instructions.

2. Cartridge Markings: Include manufacturer's name, product name, material type, batch or serial number, and adhesive expiration date.

3. Dispose of cartridges if shelf life has expired.

PART 2 PRODUCTS

2.1 MATERIALS

A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Steel Shapes:	
W-Shapes	A992
M-, S-, and HP-Shapes	A36
Channels	A36
Angles	A36
Plates	A36
Steel Sheet	A570 or A611, Class 1.
Galvanized Structural Sheet Steel	A446, G90 coating thickness
Steel Pipe	A53, Grade B
Raised-Pattern Floor Plate	A786
Hollow Structural Shapes	A500, Grade B
Stainless Steel:	

Item	ASTM Reference
Bars and Angles	A276, AISI Type 316
Shapes	A276, AISI Type 304
Steel Plate, Sheet, and Strip	A240, AISI Type 316
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316
Nuts	F594, AISI Type 316
Aluminum:	
Extruded Shapes	B221, Alloy 6061, Temper T6
Pipe	B210, Alloy 6063, Temper T6
Aluminum Sheet	B209, Alloy 3003, Temper H14
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts A153 for galvanized components
Anchor Bolts and Rods	F1554, Grade 55, with weldability supplement S1
Eyebolts	A489
Threaded Rods	A36
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436
Thrust Ties for Steel Pipe:	
Threaded Rods	A193, Grade B7
Nuts	A194, Grade 2H
Plate	A283, Grade D
Cast Iron	A48, Class 35
Malleable Iron Castings	A47

2.2 MANUFACTURED UNITS

A. Anchor Bolts and Anchor Bolt Sleeves

1. Cast-In-Place Anchor Bolts:

a. Minimum Bolt Size: ½ inch diameter by 12 inches long, unless otherwise shown.

b. Headed type, unless otherwise shown on Drawings.

c. Material type and protective coating as shown in Data Sheet – 05500 – A, FASTENER MATERIALS SCHEDULE, at the end of this section.

2. Anchor Bolt Sleeves:

a. Plastic:

1) Single unit construction with corrugated sleeve.

2) Top of sleeve shall be self-threading to provide adjustment of threaded anchor bolt projection.

3) Material: High-density polyethylene.

4) Manufacturer: Sinco Products, Inc., Middletown, CT.

b. Fabricated Steel: ASTM A36.

B. Concrete and Masonry Drilled Anchors

1. General: Materials shall be AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Data Sheet – 05500 – A, FASTENER MATERIALS SCHEDULE, at end of this section.

2. Wedge Anchors:

a. Manufacturers and Products:

1) ITW Ramset/Red Head, Wood Dale, IL; Trubolt Wedge Anchor.

2) Hilti, Inc., Tulsa, OK; Kwik-Bolt II Stud Anchor.

3) Powers Rawl, New Rochelle, NY; Power-Stud Anchor.

4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Wedge-All Anchor.

5) Wej-It Corp., Tulsa, OK; ANKRtite Wedge Anchor.

6) U.S. Anchor, Pompano Beach, FL; Kingpin Wedge Anchor.

3. Expansion Anchors:

a. Self-drilling anchors, snap-off or flush type, zinc-plated.

b. Nondrilling Anchors: Flush type for use with zinc-plated or stainless steel bolt, or stud type with projecting threaded stud.

c. Manufacturers and Products:

1) ITW Ramset/Red Head, Wood Dale, IL; Multi-Set II Drop-In and Self Drill Anchor.

2) Hilti, Inc., Tulsa, OK; Hilti HDI Drop-In Anchor.

3) Powers Rawl, New Rochelle, NY; Steel Drop-In Anchor.

4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Drop-In Anchor.

4. Sleeve Anchors:

a. Manufacturers and Products:

1) ITW Ramset/Red Head, Wood Dale, IL; Dynabolt Hex Nut Sleeve Anchor.

2) Powers Rawl, New Rochelle, NY; Hex Head Power-Bolt Anchor.

3) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Sleeve-All Hex Head Anchor.

4) Wej-It Corp., Tulsa, OK; Wej-It Sleeve Anchor.

5. Adhesive Anchors:

a. Threaded Rod:

1) ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.

2) Length as required, to provide minimum depth of embedment.

3) Clean and free of grease, oil, or other deleterious material.

4) For hollow-unit masonry, provide galvanized or stainless steel wire cloth screen tube to fit threaded rod.

b. Adhesive:

1) Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.

2) Two-component, designed to be used in adverse freeze/thaw environments, with gray color after mixing.

3) Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.

4) Nonsag, with selected viscosity base on installation temperature and overhead application where applicable.

c. Manufacturers and Products:

1) ITW Ramset/Red Head, Wood Dale, IL; Epcon Ceramic 6 Epoxy or A7 Adhesive Anchor System. (Use only Epcon A7 Adhesive System for hollow masonry.)

2) Hilti, Inc., Tulsa, OK; HIT Injection Adhesive System, HIT HY 200 (HIT HY 70 for hollow masonry).

3) Powers Rawl, New Rochelle, NY; Power Fast Epoxy Injection Gel Cartridge System.

4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Epoxy-Tie Adhesive ET.

5) Covert Operations, Inc., Long Beach, CA; CIA-Gel 7000 Epoxy Anchors.

6) Unitex, Kansas City, MO; Pro-Poxy 300 and Pro-Poxy 300 Fast Epoxy Adhesive Anchors.

6. Adhesive Threaded Inserts:

   a. Stainless steel, internally threaded insert.

   b. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-R Insert with HIT HY 200 adhesive.

C. Fasteners:

1. Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Data Sheet – 05500 – A, FASTENER MATERIALS SCHEDULE, at the end of this section.

2. Bolts, Nuts and Washers: ASTM A325, galvanized to ASTM A153 for galvanized members.

3. Anchor Bolts: ASTM F1554, Grade 36

4. High-Strength Bolts: ASTM A325 or ASTM A490, Type 1, plain uncoated. Bolt length and thread length shall be as required for the connection type shown, with hardened washers as required.

5. Direction Tension Indicators (DTIs) or Load Indicator Washers:

   a. ASTM F959, coating type to match bolt finish.

   b. Type 325 or 490, to match bolt type.

   c. Manufacturer:

      1) TurnaSure LLC, Langhorne, PA.

      2) Applied Bolting Technology Products, Ludlow, VT.

      3) Or equal.

6. Tension Control (TC) Bolts:

   a. ASTM F1852, Type 1, equivalent to A325 or A490

   b. Manufacturers:

      1) LeJeune Bolt Company, Burnsville, MN.

      2) Nucor Fastener, Saint Joe, IN.

      3) T.S. Bolts and Tools, Bristol Machine Co., Walnut, CA.

      4) Haydon Bolts, Philadelphia, PA.

      5) Vermont Fasteners Manufacturing, Swanton, VT.

      6) Or equal.

2.3 ACCESSORIES

A. Welding Materials: In accordance with the requirements of Section 05050.

2.4 SHOP FABRICATION

A. General

1. All dimensions shall be verified at the site before fabrication is started.

2. Galvanized items shall be shop fabricated and completely welded prior to galvanizing.

3. Fit and shop assemble items in largest practical sections, for delivery to site.

4. Fabricate items with joints tightly fitted and secured.

5. Welding shall be in accordance with the requirements of Section 05050.

6. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

7. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with the design of the component, except where specifically noted otherwise.

8. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

9. Miscellaneous metals work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

10. Metal Surfaces: For fabrication of miscellaneous metal work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

11. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fittings.

12. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the Engineer. Finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95% of the theoretical weight computed from the dimensions shown.

13. No splicing of any member or part of the work will be allowed where full-length members are commercially available.

14. Screws, bolts, studs and other connecting devices required in the work shall be concealed wherever possible. On all finish work where fasteners must be exposed to view, they shall be countersunk and finished flush with the exposed surfaces. All screws, bolts and other fastening devices used for exterior work shall be aluminum, bronze or stainless steel, whichever is appropriate for the work in which it is to be used.

B. Fabrication Tolerances:

1. Squareness: 1/8 inch maximum difference in diagonal measurements.

2. Maximum Offset Between Faces: 1/16 inch.

3. Maximum Misalignment of Adjacent Members: 1/16 inch.

4. Maximum Bow: 1/8 inch in 48 inches.

5. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.5 FINISHES

A. Hot Dip Galvanizing

1. Material for galvanizing shall be geometrically suitable as specified in ASTM A384 and A385.

2. To be chemically suitable for galvanizing, steel should contain carbon below 0.25%, phosphorous below 0.5%; and manganese below 1.35%. Contact galvanizer if steel does not comply to determine suitability for processing.

3. To safeguard against warpage or distortion of steel members, in conformance with ASTM A384, miscellaneous metals fabricator shall submit shop drawings of non-standard fabrications, all tubular fabrications, all fabrications involving any dimension that exceeds the size of the galvanizer's kettle, and any fabrication involving materials of different thickness. These drawings shall be submitted to the galvanizer prior to fabrication to determine the suitability of the material for galvanizing.

4. All ferrous metals specified herein or indicated on the drawings as galvanized shall be hot-dipped galvanized after fabrication in compliance with ASTM A123 as modified to include 0.5% nickel, A143, A153, A384, or A385 as applicable. Galvanizing bath shall include zinc, nickel, and other state of the art alloys designed to ensure homogeneous metallurgical growth and greater corrosion resistance.

5. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the ASTM number, and the weight of the zinc coating in ounces per square foot. Coating shall be not less than 2.3 oz. per square foot of surface. After galvanizing, steel to be painted shall be dipped in a 0.2% chromic acid solution.

6. Within 12 hours of galvanizing, a factory prime coating shall be applied to all galvanized steel that is to be painted. Prime paint shall conform to the

requirements and be of the same manufacturer as that provided under Section 09900. Finish painting is included under the Work of Section 09900.

7. To minimize distortion, material less than thirty feet in length shall be preheated in a suitable chamber maintaining a constant heat of no less than 200°F immediately prior to immersion into the molten zinc.

8. To minimize surface imperfections (e.g., flux inclusions) material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride prior to galvanizing. The type of galvanizing kettle utilizing a flux blanket overlaying the molten zinc shall not be permitted.

B. Surface Preparation and Painting

1. Pipes and electrical conduits shall match existing.

2. Surface Preparation and prime painting shall be as specified in Section 09900.

a. Prepare structural component surfaces in accordance with SSPC-SP-6 commercial sandblast, as a minimum.

b. All structural steel is to be thoroughly cleaned of dust and grit after sand blasting and before the primer is applied.

c. Prime paint utilized by the Miscellaneous Metals fabricator shall conform to the requirements and be of the same manufacturer as that provided under Section 09900.

3. Apply shop primer to top flange surfaces of composite steel beams unless indicated otherwise.

C. Steel To Be Left Unpainted

1. Clean steel surfaces in accordance with SSPC-SP3 for the following surfaces:

a. Faying surfaces of slip critical (SC) bolted connections.

b. Surfaces within 2 inches of field-welded connections.

c. Steel members to be completely encased in reinforced concrete, coated with cementitious fireproofing, or hot-dipped galvanized.

d. Bearing surfaces.

e. Surfaces to be weld-spliced in field.

D. Aluminum Materials

1. Finished contact surfaces shall be finished in accordance with the Aluminum Association designation AA-M32C22A41.

E. Stainless Steel Materials

1. After assembly, weld burn and spatter shall be passivated in accordance with ASTM A380. If the components are blast cleaned, the entire slide and frame shall be blast cleaned for a uniform finish.

2.6 SOURCE QUALITY CONTROL

A. Miscellaneous Metals fabrications, materials, and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer.

B. Inspection and testing of shop welding shall be in accordance with the requirements of Section 05050. Repair and retest defective welds as specified in Section 05050.

C. Maintain inspection and quality control records of shop and field work.

D. The Contractor shall maintain records of each impact wrench used in the shop, showing dates, sizes of bolts tested and the corresponding torque values. Certified copies of the records shall be made available to the Engineer, upon request.

E. Notify the Engineer prior to start of any fabrication, the start of sandblasting and painting, or other phases of work so as to afford them reasonable opportunity to inspect work.

F. Furnish the Engineer upon request, with the following:

1. Complete sets of approved Shop Drawings and corrective work procedures at fabricating shop(s) and in field.

2. Cutting lists, order lists, material bills, and shipping lists.

3. Information as to time and place of all rollings and shipments of material to shops and field.

4. Representative sample pieces requested for testing.

5. Full and ample means and assistance for testing materials, and proper facilities for inspection of work, in mill, shop and field.

G. Do not remove any marks or tags identifying rejected work.

H. Any work found deficient shall be corrected or replaced in accordance with these specifications. Deficient welds shall be cut out to sound material and re-welded. Deficient assemblies shall be taken apart, corrected and reassembled, using new materials as required. ASTM A490 bolts shall not be reused. ASTM A325 bolts may be retightened once only.

I. Miscellaneous Metals work that has been rejected by the Engineer in the mill or shop shall be corrected without delay and at no expense to the Owner.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify that anchor bolts, bearing plates, and other items furnished to be installed by others have been installed correctly.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. All steel and aluminum surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic

troweling applied in accordance with manufacturer's instructions prior to installation.

3.3 FIELD FABRICATION

A. No fabricated section shall be cut in the field without the permission of the Engineer.

B. All miscellaneous metals work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

C. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fittings.

D. No splicing of any member or part of the work will be allowed where full-length members are commercially available. Jointing shall meet the approval of the Engineer.

E. Screws, bolts, studs and other connecting devices required in the work shall be concealed wherever possible. On finish work where fasteners must be exposed to view, they shall be countersunk and finished flush with the exposed surfaces. Screws, bolts and other fastening devices used for exterior work shall be aluminum, bronze or stainless steel, whichever is appropriate for the work in which it is to be used.

3.4 INSTALLATION

A. Install all items furnished except items to be imbedded in concrete or masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.

B. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

C. Pack grout solidly between concrete or masonry bearing surfaces and plates to ensure that no voids remain.

D. Make no openings without the specific written approval of the Engineer. All re-entrant corners shall be shaped notch-free to a radius of at least ½ inch at blocks, copes, cuts and openings.

E. Openings in structural steel shall be cut and/or reinforced only by the structural steel Contractor, and only with the specific prior written approval of the Engineer.

3.5 ANCHOR BOLTS

A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.

B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.

3.6 CONCRETE AND MASONRY DRILLED ANCHORS

A. Begin installation only after concrete or masonry to receive anchors has attained design strength.

B. Install in accordance with manufacturer's instructions.

C. Provide minimum embedment, edge distance, and spacing as follows, unless indicated otherwise by anchor manufacturer's instructions or shown otherwise on Drawings:

Anchor Type	Min. Embedment (bolt diameters)	Min. Edge Distance (bolt diameters)	Min. Spacing (bolt diameters)
Wedge	9	6	12
Expansion and Sleeve	4	6	12
Undercut	9	12	16
Adhesive	9	9	13.5

D. Use only drill type, bit type, and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air.

E. For undercut anchors, use special undercutting drill bit and rotary hammer drill and apply final torque as recommended by anchor manufacturer.

F. When embedded steel or rebar is encountered in the drill path, slant drill to clear obstruction. If drill must be slanted more than 10 degrees to clear obstruction, notify Engineer for direction on how to proceed.

G. Adhesive Anchors:

1. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F.

2. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry where required by manufacturer's instructions.

3. Do not disturb anchor during recommended curing time.

4. Do not exceed maximum torque as specified in manufacturer's instructions.

3.7 FIELD QUALITY CONTROL

A. The fact that Miscellaneous Metals work has been accepted at the shop shall not prevent its final rejection at the job site, even after it has been erected, if it is found to be defective in any way.

B. Miscellaneous Metals erection, materials, and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer.

C. Inspection and testing of field welding shall be in accordance with the requirements of Section 05050.

D. Maintain inspection and quality control records of shop and field work.

E. Notify the Engineer prior to start of any miscellaneous metals erection, or other phases of work so as to afford them reasonable opportunity to inspect work.

F. Furnish the Engineer upon request, with the following:

1. Complete sets of approved Shop Drawings and corrective work procedures at fabricating shop(s) and in field.

2. Full and ample means and assistance for testing materials, and proper facilities for inspection of work, in mill, shop and field.

G. Do not remove any marks or tags identifying rejected work.

H. Any work found deficient shall be corrected or replaced in accordance with these specifications, without delay and at no expense to the Owner.

3.8 ADJUST AND CLEAN

A. Touch-Up Painting - Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as approved for use for shop painting.

B. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

C. For galvanized surfaces, clean field welds, bolted connections and abraded areas and touch-up all damage using suitable touch up material complying with ASTM A780.

3.9 FASTENERS

A. Anti-seizing Lubricant: Use on all stainless steel threads.

B. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

C. Provide fasteners in accordance with Data Sheet – 05500 – A, following this section, unless otherwise noted on the drawings.

DATA SHEET 05500-A
Fastener Materials Schedule

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases		
All Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
Drilled Anchors for Metal Components to Concrete (Ladders, Handrail Posts, Electrical Panels, and other Equipment)		
Exterior and Interior Wet and Dry Areas	Hot-dip galvanized steel or stainless steel sleeve, wedge, or expansion anchors, or stainless steel adhesive anchors	Use zinc-plated undercut anchors for overhead and ceiling installations.

DATA SHEET 05500-A
Fastener Materials Schedule

Service Use and Location	Product	Remarks
Submerged or Corrosive Areas	Stainless steel adhesive anchors	
Anchors in Grout-Filled Concrete Masonry Units		
All Areas	Hot-dip galvanized steel headed anchor bolts, zinc-plated or stainless steel sleeve anchors, or stainless steel adhesive anchors	
Anchors in Hollow Concrete Masonry Units		
All Areas	Zinc-plated or stainless steel sleeve anchors, or stainless steel adhesive anchors with screen tube	
Connections for Structural Steel Components		
All Areas	High-strength steel bolts	
Connections for Steel Fabrications and Wood Components		
All Areas	Stainless steel bolts	
All Others		
All Areas	Stainless steel fasteners	

END OF SECTION

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SECTION 09900

PAINTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Surface preparation and application of coatings

B. Related Sections

1.2 REFERENCES

A. The Society for Protective Coatings (SSPC):

1. Surface Preparation Specifications

a. SP-1 - Solvent Cleaning

b. SP-2 - Hand Tool Cleaning

c. SP-3 - Power Tool Cleaning

d. SP-5 - White Metal Blast Cleaning

e. SP-6 - Commercial Blast Cleaning

f. SP-7 - Brush-Off Blast Cleaning

g. SP-10 - Near-White Blast Cleaning

2. SSPC-PA 1 – Shop, Field and Maintenance Painting

3. SSPC-PA 2 - Measurement of Dry Coating Thickness with Magnetic Gages

4. SSPC Visual Standards SSPC VIS 1-89

5. SSPC Guide 6 – Guide for Containing Debris Generated During Paint Removal Operations

B. Occupational Safety and Health Administration (OSHA) Standards

1.3 SCOPE OF WORK

A. Items of work include but are not limited to the surface preparation and coating of the following:

1. Aluminum and steel in contact or embedded in concrete

2. Exposed electrical conduit, conduit fittings, and outlet boxes

3. Ferrous metal equipment provided by the Contractor

4. Exposed exterior piping

5. Interior piping, fittings and valves with the exception of plastic and stainless steel, unless noted otherwise

6. Piping support systems, excluding stainless steel
7. Touch-up painting of shop primers
8. Items listed to be painted in the interior finish schedule and on Drawings
9. Galvanized metal, at the locations specified on the Drawings
10. Back painting items that will be inaccessible to finish painting once installed including but not limited to lintels, door frames, window frames, clip angles, structural steel, miscellaneous metals
11. Miscellaneous steel fabrications

B. Coatings are not required for glass, stainless steel, chrome, cadmium plate or aluminum (not in contact with concrete).

C. Ventilation and dehumidification equipment required to provide and maintain the proper environment for worker protection and for coating application and curing.

1.4 SUBMITTALS

A. List of coating products and systems proposed, giving brand, type and manufacturer

B. Manufacturer's current printed recommendations and product data sheets for each system

C. Paint manufacturer's Compatibility Guide, to be a complete listing of all compatible paint systems/combinations produced by the paint manufacturer

D. Copies of manufacturer’s complete color charts for each coating system

E. When requested by the Engineer, provide product container labels and labeled mixing instructions for products utilized in the Work.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications – Minimum 5 years experience in application of specified products.

B. Regulatory Requirements – Meet federal, state and local requirements limiting the emission of volatile organic compounds.

C. A qualified and experienced representative of the paint manufacturer shall meet with Contractor and Engineer to coordinate items requiring painting and to schedule the Work. Monthly field visits shall occur to ensure proper application of the painting system.

1.6 DELIVERY, HANDLING, STORAGE AND PROTECTION

A. Deliver materials to painter's area in original, unbroken, containers with name and analysis of product, manufacturer's name, and shelf life date. Do not use or retain contaminated, outdated, prematurely opened, or diluted materials.

B. Store coated items carefully. Store paints and painter's materials only in areas designated solely for this purpose. Avoid damaging or dirtying coatings by contact

with soil, pavement or other harmful materials that might necessitate special cleaning. Use suitable blocking during storage.

C. Confine mixing, thinning, clean-up and associated operations, and storage of painting debris before authorized disposal, to these areas.

D. Do not expose primed surfaces to weather for more than six months before top coating. Allow less time if recommended by coating manufacturer.

E. Do not use plumbing fixtures, piping or mechanical equipment for mixing or disposal of paint materials.

F. Store waste temporarily in closed, nonflammable containers until final disposal. Keep no rubbish in painter's area longer than 24 hours. Finally, dispose of waste in an approved disposal system.

G. During surface preparation, cleaning and painting operations, protect all surfaces not to be painted.

H. Protect coated items, whether prime or finish, from damage due to shipping and handling. Use padding, blocking, fabric slings and extra care as required.

I. Upon completion of field painting, ensure coatings are undamaged and in good condition. Repair damaged or deteriorated coating, resulting from failure to observe foregoing requirements.

1.7 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.

2. Do not apply coatings when dust is being generated.

B. Cover or otherwise protect work by other trades and surfaces not being painted during all painting operations.

C. All shop primed ferrous metals shall be primed using the same coatings specified in the paint schedule.

1.8 EXTRA MATERIALS

A. Provide one spare paint container for each type and color applied.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Painting materials are designated by reference to Tnemec Company, Inc. products to establish the type and quality required. Equivalent products as manufactured by Sherwin-Williams Company, International Protective Coatings or equal will be given consideration as a substitute.

B. Substitutions of other manufacturers will be considered only if a “product for product” listing is submitted. The Engineer reserves the right to request and

receive detailed technical literature of each proposed substitution before approving any alternatives.

C. No substitutions will be considered that decrease the film thickness, the number of coats, the surface preparation or the generic type of coating specified.

2.2 MATERIALS, GENERAL

A. Paint Coatings - Suitable for intended use, recommended by their manufacturer for intended service. All coatings, unless otherwise specified, shall be suitable for severe service.

B. Products Used - Minimum of five years satisfactory use under similar service conditions

C. Use products of one manufacturer in any one paint coating system; all coating materials compatible. Coatings for touch-up - same as original.

D. Equipment prime or finish painted by the equipment manufacturer shall be painted in strict accordance with this Section and the equipment's individual specification section.

E. Bear entire responsibility in providing complete compatibility of all shop and field painting systems.

2.3 COLORS AND FINISHES

A. All finish colors will be selected from manufacturer's color chips. The Owner will select the colors. Match final colors to selected color chips, as scheduled.

B. To provide contrast between successive coats, lightly tint each coat to distinguish it from preceding coats.

C. Unless otherwise indicated, use gloss or semi-gloss for finish paint.

2.4 COATING TYPES

A. Coatings are described in the Table 09900-A Coating Schedule. Description of coating types includes minimum acceptable percent, by volume of component solids. Paint systems and dry film thicknesses are included in Table 09900-B.

PART 3 EXECUTION

3.1 GENERAL

A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into an acceptable condition through preparatory work.

B. Do not proceed with surface preparation or coating application until conditions are suitable.

C. The following shop and field instruments shall be used to inspect surface preparation and dry film thickness.

1. SSPC visual standards SSPC-VIS 1-89

2. Testex Press-O-Film replica type x-coarse

3. Surface temperature thermometer

4. Sling psychrometer and psychrometric tables

5. Type I or Type II dry film thickness gauges

6. SSPC-PA2 methods

3.2 PREPARATION

A. Basic Steps

1. Arrange to do all preparation and paint work in heated enclosure unless ambient weather conditions ensure still, dry air and 50 degree F temperature. Do not apply paints to surfaces in direct sunlight.

2. Coordinate cleaning and painting operations to eliminate contamination of one by the other.

3. Maintain all coating materials at manufacturer's recommended mixing and application temperatures for not less than 24 hours before use. Have clean, proper containers, spray equipment, applicators and accessory items ready for use before decanting or mixing paint materials.

4. Ensure proper coordination of materials to be applied hereunder with previous coatings on affected surfaces. Have all manufacturer's written directions on hand, and follow them strictly, except where otherwise specified.

5. Carefully coordinate preparation and material compatibility requirements of paint systems used by manufacturers to shop prime equipment.

B. Before any paint application, carefully clean all surfaces to be coated of dust, dirt, grease, rust, mill scale, paint unsuitable for top coatings, efflorescence, oil, moisture, foreign matter or conditions detrimental to coating bond and durability.

1. Following cleaning, apply preparatory treatment in strict accordance with manufacturer's written instructions.

2. Fill imperfections and holes in surfaces to be painted.

C. Metals

1. Prepare all field and shop primed ferrous metals, including galvanized ferrous metals, in accordance with Table 09900-B Paint System Schedule included under this Section.

2. A needle gun may be used for field welds and shop welds which occur in narrow, unprimed areas in an otherwise shop primed surface.

3. Bituminous coated metals for paint finish - clean of all dirt, grease, oil and foreign matter, and prime with a barrier coat to seal the bitumen and prevent bleeding and discoloration of finish.

4. Prepare non-ferrous and galvanized metal surfaces for finish; clean of all dirt, grease, oil and foreign substance, wash thoroughly with grease solvent, then permit to dry. Apply coatings as outlined on the Paint Schedule.

D. Provide higher degree of cleaning for acceptable equivalent paint products when paint manufacturer recommends in his printed surface preparation recommendations.

E. Concrete for Paint Finishes

1. Clean thoroughly of all form oil, release agents, dirt, dust, grease, paint, loose material and foreign matter. Remove laitance; roughen smooth surfaces by brush sand blasting.

2. After concrete has dried, prime where required in strict accordance with manufacturer's printed instructions.

3. Concrete Floors - Wash with solvent, remove all dirt, dust, grease, wax, and oil. After cleaning and washing, etch with a solution of muriatic acid and water. Allow to etch 15 to 20 minutes, and then rinse thoroughly with water and allow to dry. Muriatic acid solution; one part of 36% muriatic acid, 10 parts clean water.

4. Concrete for submerged service: clean and etch as above, or brush sand blast after cleaning. If etching is elected, neutralize with ammonia and rinse thoroughly with clean water.

F. Concrete unit masonry for paint finishes

1. Clean thoroughly by brushing, scraping and sanding or grinding slick areas.

2. Solvent wash oil, grease, and paint spots before applying block filler.

G. Before applying field coat, touch-up abraded areas of shop coats with paint of the same type. Apply an entire coat if necessary. Touch-up coats are in addition to, and not a substitute for first field coat. Clean deteriorated surfaces to bare metal before applying touch-up coat.

H. After installation and before applying field coats, touch-up all scratches and blemishes on equipment, motors, pumps, instrumentation panels, electrical switchgear, and similar items with shop coats, paint filler, enamel or other treatment customary with manufacturer.

I. After installation, touch up all scratches and blemishes on all steel.

3.3 APPLICATION

A. Conditions

1. Do not apply paints or other finish to wet or damp surfaces, except in accordance with instructions of manufacturer. Do not apply exterior paint during cold, rainy, or frosty weather, or when temperature is likely to drop to freezing within the paint coatings curing time as specified by the paint manufacturer. Avoid painting of surfaces while they are exposed to direct sunlight.

2. Paint surfaces which have been cleaned, pretreated, or otherwise prepared for painting with first finish coat as soon as practicable after such preparation has been completed, but in any event prior to deterioration of prepared surface.

3. Coat blast cleaned metal surfaces immediately after cleaning, before any rusting or other deterioration or contamination of the surface occurs. Do not coat blast cleaned surfaces later than 8 hours after cleaning under ideal conditions or sooner if conditions are not ideal.

4. Work shall conform to SSPC-PA 1.

B. Methods

1. Prepare surfaces, mix and apply paint materials in strict accordance with manufacturer's printed instructions and recommendations, except where specifically directed otherwise. Control temperature of materials upon mixing and application, surface temperature and condition, thinning and modifying.

2. Protect surfaces to be coated, before, during and after application unless ambient weather conditions are favorable.

C. Workmanship

1. Apply coating materials to meet manufacturer's spreading rate and dry film thickness recommendations. Dry film thicknesses specified are constant for brush, spray, roller or other form of application.

a. Control thinning for spray use and to manufacturer's printed instructions, and produce specified dry film thickness on level surfaces, interior and exterior angles.

b. Record quantities of materials of each type, for each coat used.

2. Apply paints and coatings using skilled painters, brushed or rolled or sprayed out carefully to a smooth, even coating without runs or sags. Flow enamel on evenly and smoothly. Allow each coat of paint to dry thoroughly, on the surface and throughout the film thickness, before the next coat is applied. High polymer coatings may be exempted from the drying requirement if recoat time is specified by manufacturer.

3. Finish surfaces - Uniform in finish and color, and free from flash spots and brush marks

4. Accessory items, finish hardware, lighting fixtures, escutcheons, plates, trim and similar finish items not to be painted: Remove or carefully mask before painting adjacent surfaces; carefully replace and reposition upon completion of adjacent painting and cleaning work.

3.4 PROTECTION, CLEAN-UP

A. Protect all materials and surfaces painted or coated under this Section, from the time of surface preparation until the final coat has fully dried. Also protect all adjacent work and materials from touch-up painting by the use of sufficient dropcloths

during the progress of this work. Upon completion of the work, clean up all paint spots, oil, and stains from floors, glass, hardware, and similar finished items.

3.5 PAINT SCHEDULE

A. Coordinate, schedule and confirm the various cleaning, touch-up and finishing operations. Ensure the transmission of materials data, color selections and coating system methods between the coating applicators. Take responsibility for not exceeding exposure and recoat time limits.

B. Color code all piping in accordance with Table 09900-C, Color Schedule. Stainless steel, carbon steel, copper, and PVC piping will not be painted. For stainless steel and PVC, color coding shall apply to the background color of the identification markers.

3.6 FACTORY ASSEMBLED EQUIPMENT AND SKID PACKAGES

A. Painting fabricated ferrous assemblies, frames, supports, skids, vessels, tanks, and OSHA guards shall strictly conform to the requirements of this Section including SSPC-SP6 surface preparation, epoxy primer, and intermediate coats, and a polyurethane topcoat.

B. Painting of piping shall be in accordance with this section.

C. The Engineer shall be given a minimum 7 day notice to witness blasting and painting operations.

D. Painting of electrical components, motors and enclosures shall be manufacturer's standard coating system with a minimum of an industrial grade painting system.

E. Submit detailed schedule of painting system(s) to be used for all equipment to the Engineer. All schedules shall be provided prior to commencement of all painting operations.

F. Stainless steel and aluminum are not required to be painted unless it is the manufacturer's standard practice.

3.7 FIELD QUALITY CONTROL

A. Leave staging and lighting in place until the Engineer has inspected surface or coating. Replace staging removed prior to approval by the Engineer. Provide additional staging and lighting as requested by the Engineer.

B. Unsatisfactory Application

1. If surface has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.

2. Evidence of runs, bridges, shiners, laps or other imperfections is cause for rejection.

3. Repair defects in accordance with written recommendations of coating manufacturer.

C. Damaged coatings, Pinholes and Holidays

1. Feather edges and repair in accordance with recommendations of paint manufacturer.

2. Hand or power sand visible areas of chipped, peeled or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on the extent of repair and appearance, a finish sanding and topcoat may be required.

3. Apply finish coats, including touchup and damage repair coats in a manner that will present a uniform texture and color-matched appearance.

3.8 FINAL TOUCH-UP

A. Prior to final completion and acceptance, examine painted and finished surfaces and retouch or refinish as necessary to leave surfaces in perfect condition.

B. After doors have been fitted and hung, refinish edges, tops and bottoms.

TABLE 09900-A
Coating Schedule

Tnemec Company Inc.	Description (Solids Content by Volume)
Series 2H Hi-Build Tneme-Gloss	Alkyd (49.0 ± 2.0%)
Series 6 Tneme-Cryl	Acrylic Emulsion (43.0 ± 2.0%)
Series 20 Pota-Pox	Polyamide Epoxy (56.0 ± 2.0%)
Series FC20 Pota-Pox (Fast Cure)	Polyamide Epoxy (58.0 ± 2.0%)
Series 23 Enduratone	Alkyd (56.0 ± 2.0%)
Series 36 Undercoater	Alkyd (56.0 ± 2.0%)
Series 39-1261 Silicone Aluminums	Silicone Aluminum (25.0 ± 2.0%)
Series 46-465 HB Tnemecol	Coal Tar (64.0 ± 2.0%)
Series 63-1500 Filler and Surfacer	Modified Amine Epoxy (100%)
Series 66 Hi-Build Epoxoline	Polyamide Epoxy (56.0 ± 2.0%)
Series N69 Hi-Build Epoxoline	Polyamidoamine Epoxy (69.0 ± 2.0%)
Series 73 Endura Shield	Aliphatic Acrylic Polyurethane (58.0 ± 2.0%)
Series 90-97 Tneme-Zinc	Aromatic Urethane, Zinc Rich (63.0 ± 2.0%)
Series 91-H2O Hydro-Zinc	Aromatic Urethane, Zinc Rich (63.0 ± 2.0%)
Series 113 Tneme-Tufcoat	Waterborne Acrylic Epoxy (44.0 ± 2.0%)
Series 120 Vinester	Vinyl Ester (89% theoretical)
Series 130 Envirofill	Waterborne Cementitious Acrylic (68.0 ± 2.0%)

TABLE 09900-A
Coating Schedule

Tnemec Company Inc.	Description (Solids Content by Volume)
Series 151 Elasto-Grip	Waterborne Modified Polyamine Epoxy (17.0 ± 2.0%)
Series 201 Epoxoprime	Modified Polyamine Epoxy (100%)
Series 218 MortarClad	Epoxy Modified Concrete (100%)
Series 219 MortarCast	Epoxy Modified Cement (100%)
Series 434 Chembloc	Modified Aliphatic Amine Epoxy Mortar (100%)
Series 435 ChemGel	Modified Polyamine Epoxy (100%)
Series 594 Omnithane	MIO/Zinc-Filled Urethane (61.0 ± 2.0%)

TABLE 09900-B
Paint System Schedule

		Finishes		
		Primer	2nd	Final
Surface	Surface Preparation	DFT = Dry Film Thickness, Mils		
Ferrous Metals, Interior Non-Submerged	SSPC-SP-6	Series 90-97 (2.5-3.5 DFT)	Series N69 (4.0-6.0 DFT)	Series 73 (2.5-5.0 DFT)
Ferrous Metals, Submerged or Intermittently Submerged – Non-Potable	SSPC-SP-10	Series 66-1211 (3.0-4.0 DFT)	Series N69 (4.0-6.0 DFT)	Series N69 (4.0-6.0 DFT)
Ferrous Metals, Submerged or Intermittently Submerged – Non-Potable – Enclosed, H2S	SSPC-SP-5 Min Anchor Pattern 3.0 mils	Series 120-5002 (15-18 DFT)		Series 120-5001 (15-18 DFT)
Ferrous Metals, Submerged or Intermittently Submerged – Non-Potable – Enclosed, H2S > 30 ppm, pH < 4	SSPC-SP-5 Min Anchor Pattern 3.0 mils	Series 435 (6.0-8.0 DFT)		Series 435 (6.0-8.0 DFT)
Ductile and Cast Iron Pipe, Interior and Exterior, Non-submerged	SSPC-SP-6	Series 66-1211 (3.0-5.0 DFT)	Series N69 (4.0-6.0 DFT)	Series 73 (2.5-5.0 DFT)
Ductile and Cast Iron Pipe, Interior and Exterior, Submerged. Non-	SSPC-SP-10	Series 66-1211	Series N69 (4.0-6.0	Series N69 (4.0-6.0

TABLE 09900-B
Paint System Schedule

Surface	Surface Preparation	Finishes: Primer	2nd	Final
		DFT = Dry Film Thickness, Mils		
potable		(2.5-3.5 DFT)	DFT)	DFT)
Ductile and Cast Iron Pipe, Interior and Exterior, Submerged. Potable	SSPC-SP-10	Series 91-H2O (2.5-3.5 DFT)	Series 20 or FC20 (4.0-6.0 DFT)	Series 20 or FC20 (4.0-6.0 DFT)
Non-Ferrous Metal (Other Than Galvanized), Interior and Exterior Non-Submerged	SSPC-SP-1 And lightly sand	Series 66 (3.0-5.0 DFT)		Series 73 (2.5-5.0 DFT)
Non-Ferrous Metal (Other Than Galvanized), Submerged or Intermittently Submerged	SSPC-SP-1 and SSPC-SP-7	Series 66-1211 (3.0-5.0 DFT)		Series 66 (4.0-6.0 DFT)
Galvanized Steel, Interior and Exterior	SSPC-SP-1 and SSPC-SP-7 1.0-1.5 mil profile	Series 594 Galvi touch-up (2.5-3.5 DFT)	Series 66 (3.0-4.0 DFT)	Series 73 (2.5-5.0 DFT)
Concrete Block Interior, Non Submerged	New or Unpainted: Broom Clean, Previously Painted: SSPC-SP-7	Series 130 (14-18 DFT)	Series 66 (3.0-6.0 DFT)	Series 66 (3.0-6.0 DFT)
Interior Concrete Walls & Ceilings	Broom Clean; Fill Large Holes with Series 218 Filler Surfacer	Series 66 (3.0-5.0 DFT)		Series 66 (4.0-6.0 DFT)
Submerged or Intermittently Submerged Concrete – Non-Potable, pH 5-10	SSPC-SP-7	Series 66 (3.0-5.0 DFT)	Series 63-1500 Filler and Surfacer	Series 66 (4.0-6.0 DFT)

TABLE 09900-B
Paint System Schedule

Surface	Surface Preparation	Finishes: Primer	2nd	Final
		DFT = Dry Film Thickness, Mils		
Plastic Pipe & Insulation, Including Fiberglass	SSPC-SP-1 and Lightly Sanded	Series 66 (2.0-3.0 DFT)		Series 66 (2.0-3.0 DFT)

TABLE 09900-C
Color Schedule

Item	Color
Pump Station Discharge Check Valve	Light Blue
Pump Station Suction Piping	Grey
Pump Station Discharge Piping	Dark Green
Electrical Conduit	Match Existing or Adjacent Surface

END OF SECTION

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SECTION 10440

INTERIOR SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Section includes the following:

a. Safety Signs

b. Panel Room Identification Signs

c. Ancillary Materials

1.2 REFERENCES

A. OSHA General Industry Standard paragraph 1910.145 (29 CFR 1910).

B. ADA Accessibility Guidelines for Buildings and Facilities – Federal Register, Vol. 56, No. 144, 7-26-91.

C. American National Standards Institute (ANSI) A117.1 – American Standard for Building and Facilities Providing Accessibility and Usability for Physically Handicapped People.

D. National Fire Protection Association (NFPA) 49 – Hazardous Chemical Data.

E. National Fire Protection Association (NFPA) 704 – Standard System for the Identification of the Hazards of Materials for Emergency Response.

F. U.S. Department of Transportation, Federal Highway Administration – Manual on Uniform Traffic Control Devices for Streets and Highways.

G. ASTM International A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

H. ASTM International D709 – Standard Specification for Laminated Thermosetting Materials.

1.3 SUBMITTALS

A. Submit to the Engineer in accordance with Section 01330, shop drawings showing dimensions, layout, text and details of construction and accessories required.

B. Submittal shall include a detailed list of the type and quantity of each sign to be supplied.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide signage as detailed on the “Signage Schedule” or otherwise specified herein.

2.2 MANUFACTURER

A. Manufacturers – subject to compliance with specification requirements, provide products of one of the following:

1. Seton Identification Products
2. ASI Sign Systems
3. Best Sign Systems
4. or equal

2.3 SAFETY SIGNS

A. Medium weight 0.040 aluminum with baked enamel finish.

B. Provide sufficient (minimum of four) eyelets (grommets) around the perimeter of each sign to allow solid anchorage.

C. Provide stainless steel mounting anchors and fasteners.

D. Safety signs shall meet the handicap access codes.

E. Provide signs in accordance with the Signage Schedule in Section 3.2.

2.4 PANEL ROOM IDENTIFICATION SIGNS

A. Manufacturers

1. Available Manufacturers: Subject to compliance with requirements, specified manufacturers and models, other manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

a. ABC Architectural Signing System
b. Allenite Division of Allen Marking Products, Inc.
c. Andco Industries Corp.
d. Architectural Graphics Corp., Inc.
e. ASI Sign Systems
f. Best Manufacturing Company
g. Spanjer Brothers, Inc.
h. The Supersine Company
i. Vomar Products, Inc.

B. Materials

1. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D790, with a minimum allowable continuous service temperature of 176 degF, and of the following general types:

a. Opaque Sheet: Where sheet material is indicated as “opaque”, provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer’s standards.

2. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

3. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

C. Unframed Panel Signs

1. Comply with the requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

a. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.

2. Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:

a. Edge Condition: Beveled

b. Corner Condition: Square Corners

3. Raised Copy: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks. Produce ADA Braille translations for all sign copy.

a. Panel Material: Matte-finished opaque acrylic sheet.

b. Raised Copy Thickness: Not less than 1/32 inch.

c. Identification signs approximately 8” x 8” shall be installed adjacent to all spaces scheduled at the end of this section. Mount wherever possible at the latch side of the door. Copy for signs shall include room number with name approximate to room name on the plan drawings.

d. Toilet room doors shall be identified with international symbols of accessibility. Toilet room doors shall be further identified by international symbol for gender as well as text.

2.5 ANCILLARY MATERIALS

A. Fasteners: Stainless steel screws or bolts of appropriate sizes.

B. Manufacturer’s standard brackets for wall mounting of two-sided exit signs.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install safety signs, legends and markings at locations either shown on the Drawings, listed in the Signage Schedule, or as directed by the Engineer.

B. Wall-mounted signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Silicon-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

2. Shim Plate Mounting: Provide 1/8-inch thick concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practical. Attach the plate with fasteners and anchors suitable for secure attachment to the substrate. Attach panel sign units to the plate using the method specified above.

3.2 SIGNAGE SCHEDULE

A. Safety Signs

Sign	Color	Size	Quantity
Danger High Voltage	Red, White and Black	14” x 10”	5
Caution Potential for Hazardous Gases	Red, White and Black	14” x 10”	2

3.3 CLEAN-UP

A. Clean signs of all dirt, grease, paint, stains, etc. after installation.

B. Replace all signs that are damaged or permanently marred during construction.

END OF SECTION

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SECTION 11000

EQUIPMENT - GENERAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Section includes the general requirements for the equipment and services to be provided under the Sections of Division 11, 13, 14 and 15, including, but not limited to, the following:

   a. Handling, storing, and installing materials and equipment during the progress of the work

   b. Coordination with equipment suppliers and subcontractors

   c. Furnishing and installing anchor bolts, assembly hardware, and foundations

   d. Providing the services of manufacturers' representatives for start-up, inspection, and testing

   e. Providing operation and maintenance manuals

   f. Providing operator training

   g. Providing lubricants, spare parts, nameplates, special tools, and safety equipment

   h. Surface preparation and shop prime painting of equipment

   i. Providing off-site inspection

   j. Providing equipment substitutions

B. Related Sections

1. Section 01770, Closeout Procedures
2. Section 03300, Cast-in-Place Concrete
3. Section 09900, Painting
4. Section 16220, AC Motors
5. Section 16221, DC Motors
6. Section 13460, Programmable Logic Controllers

1.2 DELIVERY, STORAGE AND HANDLING

A. Provide dry, heated, and ventilated storage facilities for materials and equipment awaiting incorporation in the Work. Be responsible for the protection, loss of, or damage to materials and equipment furnished until final completion and acceptance of the work. Pay for all storage and demurrage charges from suppliers and

transportation companies. Defective material and equipment shall be removed immediately from the site of the work, at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

A. Anchor bolts, nuts, washers, bolt sleeves, and assembly hardware shall be Type 316 stainless steel. Expansion bolts shall be "Thunderstuds", as manufactured by Unifast Industries, Inc., Hauppauge, NY; Redhead "Wedge Anchors" as manufactured by ITT Phillips, Michigan City, ID; Parabolt as manufactured by the Molly Division Emhart Corp., or equal. Epoxy encapsulated bolts shall be Hilti HVA Adhesive Anchors or equal. All expansion bolts and associated hardware are to be stainless steel.

B. Grout shall meet the requirements of Section 03300.

C. Motors shall meet the requirements of Section 16220 for AC Motors and Section 16221 for DC Motors.

D. Programmable Logic Controllers shall meet the requirements of Section 13460.

E. Manufacturer provided electrical work shall meet the requirements of the Division 16 - Electrical.

F. Field electrical work is included in Division 16.

G. Surface preparation and shop prime painting shall meet the requirements of Section 09900.

H. Nameplates - Provide with each piece of equipment a nameplate of non-corrodible metal, fastened in place and permanently inscribed with the manufacturer's name, model or type designation. Provide motor nameplates separately as required in Section 16220 and Section 16221.

I. Equipment Drive Guards - Provide approved all-metal guards to enclose the drive mechanism for equipment driven by open shafts, belts, chains, or gears. Guards are to be constructed of galvanized sheet steel or galvanized one inch mesh screen (woven wire or expanded metal) set in a frame of galvanized steel members. Secure guards in position by steel braces or straps, which will permit easy removal for servicing the equipment. Equipment guards shall conform with all applicable OSHA requirements.

PART 3 EXECUTION

3.1 ERECTION, INSTALLATION, APPLICATION

A. Coordination

1. Coordinate mechanical, electrical and instrumentation requirements of the equipment covered by this section with each of the Suppliers and Subcontractors working on the project. This includes but is not limited to providing each with copies of preliminary and final submittals for each equipment item that may impact the work of another Supplier or Subcontractor. The Owner is not liable for any additional costs that originate from the Contractor’s failure to properly coordinate this work. The Owner is

not responsible for any extra costs related to removal or replacement of equipment, components, conduits or wire resulting from the failure to coordinate equipment requirements.

B. Anchor Bolts, Inserts and Assembly Hardware

1. Anchor bolts and expansion bolts are to be provided by the manufacturer and set accurately in the Work by the Contractor. Anchor bolts that are set before the concrete has been placed shall be carefully held in templates. Where specified in the Contract Documents, anchor bolts shall be provided with square plates at least 4 inches by 4 inches by 3/8 inches. Alternatively, provide anchor bolts that have square heads and washers and set in the concrete forms with pipe sleeves. If expansion bolts are set after the concrete has been placed, drill and grout or caulk. Do not damage the structure or finish by cracking, chipping, or spalling concrete during the drilling and setting. Engineer will approve the setting of expansion bolts after placement of concrete.

2. Concrete inserts shall be designed by the manufacturer to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used by the inserts. Provide galvanized inserts which permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut.

3. Manufacturer shall provide assembly hardware in accordance with the complete parts list. Label all assembly hardware and package separately for delivery to the job site.

C. Foundations, Installation, and Grouting

1. Furnish the necessary materials and construct concrete foundations for all equipment installed. Foundation size and elevations may be determined in the field by the Engineer. The tops of foundations shall be at such elevations as will permit grouting as specified below.

2. Install all equipment in accordance with the manufacturer’s instructions. .

3. In setting pumps, motors, and other items of equipment, make an allowance of at least 1 inch for grout under the equipment bases. Use steel shims to level and adjust the bases. If shims are left embedded in the grout, install neatly and so as to be as inconspicuous as possible in the completed Work. Unless otherwise required by the manufacturer, use a non-metallic non-shrink grout as specified in Section 03300.

4. Mix and place grout in accordance with the manufacturer’s recommendations. Where practicable, place the grout through the grout holes in the base and work outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form. Construct form to provide a 1 inch chamfer around the top edge of the finished foundation.

5. Rub foundations in accordance with 03300.

D. Services of a manufacturer's representative

1. Arrange for a qualified service representative from each company manufacturing or supplying equipment to perform the work described in this section.

2. Inspect, operate, test, and adjust the equipment after installation has been completed and the equipment is presumably ready for operation, but before it is operated by others. At a minimum, include the following points in the inspection:

   a. Soundness (without cracked or otherwise damaged parts).

   b. Completeness in all details, as specified.

   c. Correctness of setting, alignment, and relative arrangement of various parts.

   d. Adequacy and correctness of packing, sealing and lubricants, etc.

3. Operate, test, and adjust equipment to prove that it is left in proper condition for satisfactory operation under the conditions specified.

4. Upon completion of this work, submit, 3 copies to the Engineer of a complete, signed report of the results of this inspection, operation, adjustments, and tests. Include in report a detailed description of the points inspected, tests and adjustments made, quantitative results obtained, and suggestions for precautions to be taken to ensure proper maintenance. Certify in the report that the equipment (1) has been satisfactorily installed and conforms to the Contract Documents; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping, supports or anchor bolts; (4) has been operated under full load and operates satisfactorily; and (5) that nothing in the installation will render the manufacturer's warranty null and void.

5. After the Engineer has reviewed the reports from the manufacturer's representatives, make arrangements to have the manufacturer's representatives present when the field acceptance tests are made.

E. Lubricants - Prior to testing and acceptance, furnish a one year's supply of all lubricants recommended by the manufacturers of each component of the equipment provided.

F. Spare Parts – Pack spare parts in containers or boxes bearing labels clearly designating the contents and the piece of equipment for which they are to be used.

G. Special Tools - For each type of equipment furnished, provide a complete set of special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

   Special tools are considered to be those which because of their limited use are not normally available, but which are necessary for the particular equipment.

H. Submit operation and maintenance manuals for items listed in pertinent other sections of these Specifications and for other items when requested by the Engineer.

Provide manuals a minimum of 60 days prior to equipment start-up. Manuals shall comply with the requirements of Section 01770.

I. Operator Training

1. Upon satisfactory completion of the start-up and calibration, provide the services of a manufacturer's representative to instruct Owner's personnel in the proper operation and maintenance of the equipment. This separate period of on-site training shall be provided independent of start-up and testing services.

2. The manufacturer's representative who will be providing the instruction shall have prior operation, maintenance and instructing experience acceptable to the Engineer.

3. When requested, submit the manufacturer's representative's name and qualifications to the Engineer for approval at least one week prior to the scheduled operating and maintenance instruction sessions.

4. Provide the Owner with a minimum 7 days written notice of planned operator training.

J. Protection Against Electrolysis - Where dissimilar metals are used in conjunction with each other, provide insulation between adjoining surfaces to eliminate direct contact and any resultant electrolysis. Use bituminous impregnated felt, heavy bituminous coating, non-metallic separators or washers, or other approved materials as insulation materials.

K. Surface Preparation and Shop Prime Painting

1. Paint System: Upon receipt of approval by the Engineer, notify all equipment and material suppliers of the selected manufacturer of the paint for the project. Give written direction to each supplier with prime paint designations, colors, and mil thickness coverage requirements. Primer paint must be compatible with the specified and approved field-applied top coats. Surface preparation and shop priming shall be in accordance with the provisions of Section 09900 unless otherwise specified in Division 11 Sections. Ship chains, sprockets, gears and the like from the factory with a heavy coating of protective grease.

2. Field painting shall be in accordance with the provisions of Section 09900.

3. Certain equipment is specified to be field prepared and field primed. Refer to appropriate equipment sections for definition.

L. Off-Site Inspection - Fabrication, manufacture, painting or testing work may be inspected by the Engineer before shipment. Give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

M. Plant Equipment Substitutions Which Cause Engineering and Contract Changes - Plant equipment installation as shown on the Drawings and as specified herein, are based on the equipment furnished by one manufacturer. Equipment which is offered

as a substitute to the specific requirements of these Specifications and which differs in detail and arrangement from that shown may require changes in design and construction. All costs which result from such changes in design and construction are to be borne entirely and unconditionally by the Contractor; said costs to include but not be limited to structural, piping, mechanical and electrical changes and all engineering costs incurred as a result of the substitution, in the revision of Drawings and Specifications, review of design changes by others, preparation of Change Orders, and any other costs directly resulting from said substitution.

3.2 PERFORMANCE TESTS - GENERAL

A. All equipment, components and systems furnished under this Contract, including those furnished by Subcontractors, must be demonstrated to achieve compliance with the Contract performance requirements.

B. Furnish all materials required for the start-up, debugging, and performance testing of all systems furnished under this Contract.

END OF SECTION

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SECTION 11285

SLUICE GATES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Sluice gates
2. Manual Actuators

1.2 REFERENCES

A. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

B. ASTM A276 - Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes

C. ASTM B21 – Standard Specification for Naval Brass, Rod, Bar, and Shapes

D. ASTM B98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes

E. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications

F. AWWA C501 - Standard for Cast-Iron Sluice Gates

G. Steel Structures Painting Council (SSPC)

1.3 SUBMITTALS

A. Functional field and leakage test procedures and checklist at least two weeks in advance of testing

B. Description of surface preparation and shop prime painting of gates and accessories.

C. Manufacturer's field reports following field checking of sluice gates and appurtenances after installation and before equipment is placed in operation

D. Leakage test reports upon completion of field leakage tests

E. Product Data - manufacturer’s technical data, detail drawings, and installation instructions

F. Six copies of Operation and Maintenance Manuals

G. A list of the manufacturer's recommended spare parts with the manufacturer’s current price for each item.

1.4 QUALITY ASSURANCE

A. Gates and appurtenances provided under this Section shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service. If required, the manufacturer shall furnish evidence of similar installations in satisfactory operation.

B. All sluice gates and related components shall be the product of one manufacturer.

C. Gate manufacturer shall have a minimum of 10 years' experience in the successful production of equipment similar to those specified and shall have a minimum of 100 similar installations in service for at least 5 years.

D. Field Measurements - Verify size, location and placement of sluice gates prior to fabrication.

E. Shop Assembly - Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments.

F. The gate manufacturer's shop welds, welding procedures, and welders shall be qualified and certified in accordance with the requirements of the latest edition of ANSI/AWS D1.1 or ASME Section 9.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Sluice gates shall be completely shop assembled to insure proper fit and adjustment of all parts. Sluice gates shall be complete when shipped and the manufacturer shall use all due and customary care in preparing them for shipment to avoid damage in handling or in transit. Particular care shall be taken to see that parts are completely closed and locked in position before shipment.

B. Deliver materials to the site to ensure uninterrupted progress of the Work.

C. Store all sluice gates and appurtenances off the ground in an approved enclosed shelter. Protect all materials from condensation and corrosion.

D. Handle gates and appurtenances with extreme care. Sluice gates which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable. Protect all threads, seats, and ends from damage.

1.6 SPARE PARTS

A. Furnish with each sluice gate, the manufacturer's standard set of spare parts.

B. Spare parts shall be furnished packed in suitable containers and clearly labeled designating the contents and the unit for which they are intended.

C. Furnish all special tools required for the operation and maintenance of the equipment.

D. Lubricants - Prior to testing and acceptance, furnish a one year's supply of all lubricants recommended by the manufacturers of each component of the equipment furnished and installed.

1.7 DESIGN CRITERIA

A. Sluice gates shall meet or exceed the requirements of AWWA C561 (latest revision) pertaining to design safety factors, stem and stem guides positioning, and manual

lifting devices. The allowable leakage shall be 0.1 gpm per foot of wetted perimeter under seating and unseating head conditions.

B. The sluice gates shall conform to the requirements specified in the Gate Schedule of Section 2.6 and as shown on the Contract Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide sluice gates and appurtenances as manufactured by one of the following:

1. Whipps, Inc., Athol, MA
2. RW Gate Co., Troy, NY
3. Hydro Gate, Denver, Colorado

2.2 MATERIALS

A. Frame Assembly, Guide Rails, Yokes, Slide and Retainers - Stainless Steel, Type 304, ASTM A-240

B. Invert and Stiffeners - Stainless Steel, Type 304, ASTM A-276

C. Stems- Stainless Steel, Type 304, ASTM A-276

D. Fasteners, Nuts and Bolts - Stainless Steel, Type 304, ASTM A-276

E. Bottom Seal (Upward Opening Gates Only) - Neoprene ASTM D-2000

F. Guides, Side Seals, and Top Seal - Ultra-High Molecular Weight Polyethylene, ASTM D4020. Neoprene seals such as J-seals or P-seals will not be allowed for top and side seals.

G. Seat and Facing - Ultra-High Molecular Weight Polyethylene ASTM D4020

H. Lift Nuts, Stop Nuts - Bronze ASTM B584

I. Stem Block - Stainless Steel, Type 304, ASTM A-240

J. Pedestal - Stainless Steel, Type 304, ASTM A-240

K. Wall thimble (if required) - Stainless Steel, Type 304, ASTM A-240

L. Anchor bolts, nuts, and other fasteners furnished for connection of the equipment to the concrete structures shall be of Type 316 stainless steel. They shall be of ample size and strength for the purpose intended. Anchor bolts shall be provided by the Manufacturer.

2.3 SLUICE GATES

A. Gates shall be conventional frame, rising stem, fabricated of 304 stainless steel having adequate strength to prevent distortion in handling and placing and under any condition of service outlined herein. All gates shall be from one manufacturer with similar sizes identical and parts interchangeable.

B. Unless otherwise noted, sluice gates shall conform in all respects to the latest edition of AWWA C561. All frames, discs, and guides shall conform to minimum AWWA C561 standards for tensile, compressive, and shear strength.

C. Sluice gates shall be designed to safely withstand conditions listed in Sluice Gate Schedule with liberal safety factors used in the design of all the equipment. Working stresses will not exceed the lower value of one third of the yield strength or one fifth of the ultimate strength of the material. At a minimum, safety factors shall conform to those of AWWA C561.

D. Provide each sluice gate with a brass or Type 316 stainless steel nameplate. Nameplates shall be permanently fastened to the frame at the factory in a location visible during normal operation.

E. Frame

1. The frame assembly, including the guide members, invert member and yoke members, shall be constructed Type 304 Stainless Steel with a minimum thickness of ¼ inch.

2. The guide rails shall be constructed of formed plate stainless steel with a minimum thickness of ¼-inch, designed to withstand total thrust due to the water pressure and the wedging action.

3. The structural portion of the frame that incorporates the seat/seals shall be formed into a one-piece shape for rigidity.

4. Frame design shall allow for mounting to a wall thimble and / or directly to a wall with stainless steel anchor bolts and grout. Mounting style shall be as indicated on the Gate Schedule and / or as recommended by Manufacturer given existing conditions and approved by Engineer.

5. A yoke shall be provided across the top of the frame. The yoke shall be formed by two structural members affixed to the top of the side frame members to provide a one-piece rigid assembly. The yoke shall be designed to allow removal of the slide.

6. A rigid stainless steel invert member shall be provided across the bottom of the frame opening. The invert member shall be of the flush bottom type on upward opening gates where indicated in the Gate Schedule.

7. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.

8. The frame configuration shall allow the replacement of the top and side seals without removing the gate frame from its installation location.

9. Where the guides extend above the operating floor, they shall be sufficiently strong so that no further reinforcing shall be required.

10. The gates shall be self-contained. Frames must be assembled in the shop and shall be shipped in one piece. Assembly of the frames in the field will not be allowed.

F. Disc / Slide

1. The disc or sliding member shall be of stainless steel plate, minimum ¼" and shall be constructed to limit the deflection at the maximum specified head to 1/720th of the span of the gate or 1/16 inch, whichever is smaller.

2. The portion of the slide that engages the frame shall have a minimum material thickness of 1/4 inch.

3. Reinforcing stiffeners shall be welded to the slide and mounted horizontally. Two vertical stiffeners shall be welded to the outside of the horizontal stiffener for additional reinforcement.

4. The stem connector shall be constructed of two angles or plates. The stem connector shall be welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.

G. Stems

1. The operating stem shall be of a size to safely withstand, without buckling or distortion, the stresses induced by all operating forces.

2. The stem shall be designed by the manufacturer to transmit in compression at least 2-1/2 times the rated output of the operating mechanism with a 40 lb. effort on the crank.

3. The stem shall be of solid Type 304 stainless steel bar for the entire length, the metal having a tensile strength of not less than 60,000 psi.

4. The stem shall be minimum 1.5 inches having sufficient diameter at the base of the thread to lift the weight of the gate, offset the resistance of the gate to the maximum unbalanced head and fully allow for starting impact.

5. The threaded portion of the stem shall have machine cut or rolled threads of the Acme type.

6. All threaded and keyed couplings of the same size shall be interchangeable.

7. The gates shall be provided with adjustable stop collars on the stem to prevent over closing of the gate.

8. Manually operated, rising stem gates shall be provided with an adjustable stop collar on the stem above the floorstand lift nut.

9. Rising stems shall be furnished with a transparent plastic pipe stem cover with gate position markings on the pipe. Cover shall be of sufficient diameter and length to permit full travel of the threaded stem without obstruction.

H. Stem Guides

1. Stem guides shall be stainless steel, bronze or UHMW bushed, and mounted on stainless steel brackets.

2. Stem guides shall be adjustable in two directions and shall be spaced at sufficient intervals to adequately support the stem.

3. Stem guide spacing shall not exceed 10 feet and shall not exceed an L/R ratio of 200.

I. Wall Thimbles

1. Contractor and Manufacturer shall inspect existing wall thimbles, and where deemed acceptable, utilize the existing walls thimbles.

   a. Use of existing thimbles shall not jeopardize the integrity of the sluice gate, reduce its performance in any way, or shorten its life expectancy.

2. Where thimbles are not approved for reuse, Contractor shall provide a thimble in accordance with the following specifications:

   a. Wall thimbles shall be furnished for all sluice gates that are not attached to pipe flanges.

   b. Refer to the Manufacturer for wall thimble type to match existing.

   c. Wall thimbles shall be stainless steel, one-piece construction of adequate section to withstand all operational and reasonable installation stresses.

   d. Wall thimbles shall be internally braced during concrete placement with a center ring or water stop cast around the periphery of the thimble..

   e. The front flange shall be machined and have tapped holes for the sluice gate attaching studs, and metal stamped vertical centerlines with the word “top” for correct alignment.

   f. Provide a permanent gasket for uniform thickness or suitable mastic between the sluice gate and the wall thimble.

J. Flush Bottom Closure

1. The flush bottom closure type of gate shall have a compressible resilient seal attached to the bottom of the disc (sliding member) with a stainless steel bar and fasteners. Alternatively, the flush bottom seal can be mechanically fastened in the invert of the frame.

2. The seal shall be of a specially extruded shape, and designed to accurately fit to the bottom rib of the disc.

3. The seal shall be shaped to produce a wide sealing area on a machined cast iron stop bar that is bolted to the gate frame to form a flush invert.

4. The differential sealing pressure of the resilient seal on the stop bar shall be variable by adjustment of the side wedges on the gate.

2.4 MANUAL ACTUATORS

A. All manual operators shall turn right to close unless otherwise specified. Operators shall indicate the direction of operation. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.

B. The crank shall have a minimum radius of 12 inches and a maximum radius of 15 inches.

C. Actuator types are indicated on the Gate Schedule.

D. Crank actuators shall attach to a square ¾" pinion nut that is located 42 inches above the finished floor or top of structure and shall be mounted on the yoke of self-contained gates or on the pedestal of non-self-contained gates.

E. The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40 lb. effort when the gate is in the closed position and experiencing the maximum operating head.

F. Operators shall be equipped with fracture resistant clear butyrate or lexan plastic stem covers.

G. The top of the stem cover shall be closed.

H. The bottom end of the stem cover shall be mounted in a housing or adapter for easy field mounting.

I. Stem covers shall be complete with indicator markings to indicate gate position.

J. Crank Actuators

1. Crank-operated gearboxes shall be fully enclosed and shall have a cast aluminum or ductile iron housing.

2. Gearboxes shall have either single or double gear reduction depending upon the lifting capacity required.

3. Provide right-angle geared crank drive.

4. Gearboxes shall be provided with a threaded cast bronze lift nut to engage the operating stem.

5. Roller-type bearings shall be provided above and below the flange on the operating nut to support both opening and closing thrusts.

6. Gears shall be steel with machined cut teeth designed for smooth operation.

7. The pinion shaft shall be minimum 1 inch diameter stainless steel and shall be supported on ball or tapered roller bearings.

8. Positive mechanical seals shall be provided on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.

9. The crank shall be cast aluminum with a revolving nylon grip and shall attach to the gear box via a square ¾" pinion nut.

10. The crank shall be removable from the square ¾" pinion nut to allow for operation of the gate by other means (i.e. mechanical drill with square ¾" socket).

2.5 FINISHES

A. Cleaning and Preparation

1. After assembly, surfaces shall be cleaned by blast cleaning in accordance with the requirements of the SSPC-SP6, commercial blast. Prime and finish paint shall conform to the requirements of the Manufacturer.

2. All surfaces shall be dry and free of grease before painting in conformance with the paint manufacturer's instructions.

B. Coating

1. The gate manufacturer shall be responsible for shop prime and finish painting of all gates and appurtenances supplied under this Section.

2. All coatings shall conform with VOC Emission Regulations in effect at the manufacturing location and at the project site to allow touch-up or recoating to be performed with the same products.

3. The number of coats, mil thickness and surface preparation shall be in accordance with the paint manufacturer's recommendations for the gates application, but in no case shall be less than the requirements in the following schedule.

4. Colors shall be manufacturer's standards, provided they are selected for ease of field touch-up and color match and are fade resistant. Colors shall be selected to provide contrast between the product and the prime coat, and between the prime coat and the finish coat, to insure uniform covering and coating thickness.

5. Coatings shall be applied after assembly and in accordance with the paint manufacturer's recommendations for thinning, technique and safety precautions.

6. Where required by application, the coating shall be approved for contact with drinking water by NSF, EPA, or other appropriate governing agencies.

C. Touch-up coatings with same products in field after installation of gates to repair any blemishes or damage to manufacturer's coating system.

2.6 GATE SCHEDULE

The Gate Schedule is shown below. Conform to all requirements specified.

Location	**Brook Street & Conant Street Pump Station – Wet Well Tanks from Influent Channel**	**Brook Street & Conant Street Pump Station – Wet Well Tank Diversion Walls**
Type	Self-contained slide gate with rising stem	Self-contained slide gate with rising stem
Quantity	6	4
Tag Number(s)	SG-BS1; SG-BS2; SG-BS3; SG-CR1; SG-CR2; SG-CR3	SG-BS4; SG-BS5; SG-CR4; SG-CR5
Gate Opening Direction	Up	Up
Material	Type 304 Stainless Steel	Type 304 Stainless Steel

Material Minimum Thickness	¼″	¼″
Opening Size	14”x14”	14”x14”
Aprox. Invert to Floor	4’- 0”	9’- 6”
Max. Head (measured from invert of gate)	10'-0"	10'-0"
Seating Direction	Seating Only	Seating Only
Mounting/Wall Fitting/Application	Wall face mounted, utilize existing thimble (if acceptable), tank isolation from channel	Wall face mounted, utilize existing thimble, invert is flush with tank bottom and may require removing and replacing tank bottom grout or asphalt.
Actuator Type	Manual operation, removable hand crank to allow optional operation with portable mechanical drill-type operator	Manual operation, removable hand crank to allow optional operation with portable mechanical drill-type operator
Actuator Mounting	Yoke mounted, pinion shaft located 42" above operator floor elevation	Pedestal mounted, pinion shaft located 42" above operator floor elevation
Clear Plastic Stem Cover	Yes	Yes

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate exact dimensions of sluice gate openings required for proper installation of gates assemblies with sluice gate manufacturer.

B. Repairs required to concrete surfaces as a result of the execution of the Work shall be made in a manner satisfactory to the Engineer at no additional cost to the Owner. No repair work shall commence until the Contractor has received Engineer's approval of proposed methods and materials.

3.2 INSTALLATION

A. Install all sluice gate and appurtenances in accordance with manufacturer's printed installation manual. Use extreme care in the handling, storage and installation of all equipment to prevent damage or distortion and insure proper performance.

B. Frames and guides shall be installed in a true vertical plane and shall be installed with 90 degree corners.

C. Set anchor bolts in accordance with manufacturer's approved drawings and requirements.

D. Install identifying and operating labels and/or tags permanently attached to equipment.

E. Final Checks Before Startup: Perform the following preventive maintenance operations and checks before startup:

1. Remove covers from grease-lubrication-type bearings, flush bearings with kerosene, and thoroughly clean. Fill with new lubricant according to manufacturer's recommendations.

2. Check that stems are free to rotate by hand. Do not operate if bound or even dragging slightly, until cause of trouble is determined and corrected.

3. Test and adjust operation and tolerances of gates. Replace damaged and malfunctioning equipment.

F. Apply anti-seize compound, such as Never-Seez or approved equal, to all fasteners.

3.3 CLEAN-UP

A. Frames and slides shall be cleaned after fabrication. All weld splatter shall be removed and all scratches shall be polished.

B. Clean dirt and debris from gates and operators.

3.4 FACTORY TESTING, FIELD ADJUSTMENTS AND FIELD TESTING

A. Adjust all parts and components as required to provide proper operation.

B. Factory Testing

1. Gates shall be tested for leakage and operation before shipping to the project site. Gates shall be completely shop assembled and adjusted so that the maximum field leakage shall be 0.1 gallons per minute per foot of perimeter under seating and unseating head conditions.

2. The manufacturer shall notify the Engineer a minimum of 2 weeks prior to the shop tests. If the Engineer is unable to attend the shop tests, the manufacturer shall video tape the tests, if requested by the Engineer, and send a copy of the video to the Engineer. In addition, the manufacturer shall provide test results to the Engineer for approval.

C. Field Testing

1. Conduct field test of each gate in presence of Engineer to demonstrate that each part and all components together function correctly. Subject the sluice gates to a seating static water pressure equal to the design head. Allow to stand for 60 minutes or as directed by the Engineer in the field. Measure and record volume of water lost to gate leakage. The leakage shall not exceed 0.1 gpm per foot of wetted perimeter.

2. Similarly, subject the sluice gates to an unseating static water pressure equal to the design head. Measure and record volume of water lost to gate leakage

after a 60 minute period. The leakage shall not exceed 0.1 gpm per foot of wetted perimeter.

3. If gate exceeds the maximum leakage specified, it shall be modified and retested until compliance with specified requirements can be demonstrated. Provide all testing equipment required.

4. Submit test results to Engineer.

D. Manufacturer's Service

1. Provide the services of a qualified, factory trained representative of the manufacturer to check and approve the installation before it is placed in operation.

2. The field service representative shall be a full-time employee of the manufacturer and shall have at least 5 years experience in the type of sluice gate equipment furnished under these Specifications. Manufacturer's agents will not be allowed to perform field service requirements.

3. Manufacturer's representative shall provide a minimum of 4 hours on-site instruction to the Owner's personnel in the operation, care and maintenance of the gates and appurtenances.

3.5 WARRANTY

A. Warranty all equipment furnished under this Section for a period of one year from the date of Substantial Completion. Provide for the replacement of all material and parts required in the warranty period, without cost or delay to the Owner.

END OF SECTION

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SECTION 11310 - **PROPRIETARY**

FLOODED SUCTION IMMERSIBLE NON-CLOG PUMP FOR BROOK STREET PS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. The Owner has pre-selected the flooded suction immersible non-clog pump for this project. The flooded suction immersible non-clog pump is an I-Series™ 4C3 complete pump and motor manufactured by Smith & Loveless, Inc., Lenexa, Kansas. The equipment and services specified in this Section 11310 (exclusive of installation) shall be purchased by the Contractor.

2. Provide all labor, equipment and materials necessary to furnish, install, test and place in operation one (1) vertically-mounted, close-coupled, motor-driven, immersible, non-clog type centrifugal pumping unit at the Brook Street Pump Station, as shown on the plans and as specified herein.

3. Unit shall be furnished with pump, pedestal base, suction elbow, driver, motor support base with guard, along with necessary steady bearing(s) and shaft guards, and other ancillary equipment specified herein.

B. Related Sections

1. Section 01140 – Work Restrictions

2. Section 11000 - Equipment – General

3. Division 15 - Mechanical

4. Division 16 – Electrical

1.2 REFERENCES

A. AFBMA (Anti-Friction Bearing Manufacturer Association)

B. HIS (Hydraulic Institute Standards - 1990)

C. ANSI (American National Standards Institute)

D. ISO (International Organization for Standardization)

E. ASTM (American Society of Testing and Materials)

F. National Electric Code

G. Underwriters Laboratories (UL)

1.3 SYSTEM DESCRIPTION

A. Wastewater pump to be replaced at the Brook Street Pump Station.

B. Pumping unit will be connected to an individual suction line that draws sewage from the pump station wet well.

C. Wastewater is discharged from pump, through a new check valve, to a common discharge pipe header to the force main.

D. Pump will be controlled by the existing wet well level control PLC.

E. Pump shall be connected to MCC as shown on the drawings.

1.4 SUBMITTALS

A. General

1. Comply with the pertinent provisions of Section 01330 (Submittals).

B. Quality Assurance/Control Submittals

1. A statement from the manufacturer that the pump will function properly as installed with respect to the suction piping layout as shown on the Drawings.

2. A "Letter of Compliance" from the manufacturer stating that the characteristics of the pump (specifically naming the respective pump), is such that it will not overload the specified motor horsepower under any head condition when operating at the specified maximum speed, and that the motor will not overheat at maximum turndown.

3. A certificate from the pump manufacturer stating that the installation of the pumping unit is satisfactory, that the equipment is ready for operation, and that the operating personnel have received operation and maintenance training.

C. Shop Drawings

1. Manufacturer's rating curves showing pump characteristics of discharge, head, capacity, brake horsepower, efficiency, required net positive suction head, and required minimum submergence.

2. Submit multiple pump curves covering speed ranges for the proposed pump. Each curve shall plot total dynamic head (ft) versus flow rate (gpm), horsepower versus flow rate (gpm), and efficiency versus flow rate (gpm). This information shall be prepared specifically for the pump proposed.

3. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, and total pumping unit weight. This information shall be prepared specifically for the pump proposed. Catalog sheets showing a family of curves will not be acceptable.

4. Details of fabrication, erection, and adjoining equipment interfaces for all equipment furnished under this section, along with dimensional drawings of each item of equipment and auxiliary apparatus to be furnished.

5. Certified foundation, pump support, and anchor bolt plans and details.

6. Certified motor test data.

7. Submit manufacturer’s electrical requirements for pumps including ladder-type wiring diagrams for interlock and control wiring, clearly indicating required field connections.

8. Bearing life calculations.

9. Equipment start-up reports.

10. Operation and Maintenance Manuals

D. Factory Tests

1. Hydraulics

a. Certified factory test data including performance curves for each of the proposed pumps from shut off to maximum capacity, showing total dynamic head, hydraulic and overall (wire-to-water) efficiency, brake horsepower, required NPSH, and minimum submergence.

b. A minimum of six points, including shutoff, shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition. Pumps shall be hydrostatically tested for a pressure equal to two times the shut-off head. Results of the performance tests including data and test points shall be certified by a Registered Professional Engineer and submitted for approval before final shipment.

2. Vibration tests shall be performed per manufacturer's recommendations. Certified copies of the test results shall be submitted to the Engineer for approval prior to shipment.

1.5 QUALITY ASSURANCE

A. General

1. These specifications direct attention to certain features of the pumping unit, but do not purport to cover all of the detail of its design. The equipment furnished shall be designed and constructed equal to high-quality pumping equipment manufactured by such firms as are mentioned hereinafter for the various type of pumps, or those approved by the Engineer.

B. Manufacturer

1. The plans and specifications have been prepared based on the Smith & Loveless, Inc. flooded suction immersible non-clog pump I-Series™ 4C3. The Town has preselected smith & Loveless as the Manufacturer of this pump. No other pump Manufacturer shall be accepted.

2. Manufacturer shall provide a list of names and dates of installations for similar flooded suction immersible non-clog pumps.

C. Coordination

1. The pumping unit required under this Section shall be complete including pumps, motors, and intermediate shafting. The pump manufacturer shall be responsible for the furnishing and performance of all equipment.

2. The Contractor and pump manufacturer shall assume responsibility for the satisfactory installation and operation of the entire pumping system including but not limited to the pumps, motors, starters and shafting, as specified.

3. The pump manufacturer shall coordinate with the motor manufacturer to assure a matched and working system.

4. The Contractor shall ensure that the pump and motor, and shafting manufacturers coordinate all equipment being provided.

5. The pumping equipment shall be adequately and safely designed and constructed for heavy-duty use and continuous operation at the pressures and under all conditions of service to which they may be subjected.

1.6 DELIVERY, STORAGE AND HANDLING

A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation. On-site precautions must be taken by the Contractor to ensure adequate protection during storage.

1.7 SEQUENCING

A. Refer to Section 01310 (Coordination) for requirements associated with the sequencing of the pumping system work.

1.8 SPARE PARTS

A. Furnish with the pump and drive, the manufacturer's standard set of spare parts including at least the following:

1. One (1) set of pump casing gaskets.

2. One (1) set of mechanical seals.

3. One (1) shaft sleeve with keys, nuts, and o-rings.

4. One (1) set of wearing rings for each pump.

5. One (1) set of radial and thrust bearings.

6. One (1) set of set screws.

7. One (1) set of replaceable elements for shaft couplings.

8. One (1) stuffing box throat bushings.

B. Spare parts shall be furnished packed in suitable containers and clearly labeled designating the contents and the unit for which they are intended. A minimum of one quart of touch-up paint shall be provided with the equipment.

C. Furnish all special tools required for the maintenance of the new pumps.

D. Lubricants - Prior to testing and acceptance, furnish a one year's supply of all lubricants recommended by the manufacturers of each component of the equipment furnished and installed.

1.9 OPERATION AND MAINTENANCE MANUALS

A. Provide O&M Manuals and Equipment Start-up Reports per Sections 01330, 01770, and 11000.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The equipment specified under this Section shall be by Smith & Loveless, Inc. This is a proprietary specification. Substitutions will not be accepted.

B. The listing of a specific pump model herein in no way relieves the pump supplier from complying with all other requirements of this specification. Listing indicates compliance only with the performance criteria.

2.2 GENERAL

A. Comply with the requirements of Section 11000 (Equipment – General).

B. Parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially constructed for the work to be done. Ample room and facilities shall be provided for inspection, repairs, and adjustment.

C. All necessary foundation bolts, plates, nuts, and washers, shall be furnished. Anchor bolts shall be 316 stainless steel, sized by the equipment manufacturer.

D. Brass or stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed, serial number, and all other pertinent data shall be attached to each pump and motor. A special data plate shall be attached to the pump frame, which shall contain identification of frame and bearing numbers.

E. The pumps shall operate throughout the entire operating range, within the vibration limits specified herein.

2.3 PERFORMANCE DATA

A. Refer to Table 1 at the end of this section.

2.4 PUMP CONSTRUCTION

A. Casing

1. The pump casing shall be a one-piece volute type with integral discharge nozzle. The volute casing shall be dual-curved to reduce radial thrust.

2. The casing shall be designed for handling raw sewage and shall be of cast iron conforming to ASTM A48 (ASTM A278), Class 30 or better, of minimum 3/4” nominal thickness, and suitably ribbed to withstand all stresses and strains of service at full operating pressure. Each casing shall be hydrostatically tested to twice the shut-off pressure, provided with vent, drain, and gauge connections.

3. The volute shall be oriented with suction and discharge to match existing piping configuration. Contractor and Manufacturer to coordinate and field verify existing conditions and dimensions to ensure precise fit within the existing piping configuration.

4. No stationary guides or splitters will be permitted on either the suction or discharge sides of the casing.

5. The casing shall be provided with tapped and plugged (removable) vent (1-inch), drain, and gauge connections.

6. Two lifting eyes minimum shall be furnished to facilitate handling.

7. The discharge connection shall be a 125 lb. American standard raised face flange positioned as indicated on the Drawings.

B. Suction Elbow and Backplate

1. The suction elbow and backplate shall be of the same material as the casing, cast separate from the volute.

2. Increasing suction elbow shall be provided as the nominal pump size is smaller than the suction line.

3. The suction and backplate shall be shoulder fitted to the casing and assembled with studs to assure accurate alignment.

4. A 2” tapped hole shall also be provided in the side of the elbow for use in applying water pressure to unclog the pump in case of blockage.

5. The pump suction shall have 125-pound standard raised face flanged and shall be provided without the use of pipe adapters. Standard commercial fittings shall not be substituted.

C. Impeller

1. The impeller shall be balanced non-clogging type made of close-grained cast iron conforming to ASTM A48 (ASTM A278) Class 30 or better. The impeller shall be cast in one piece and shall be dynamically balanced. Rotation of the impeller shall correspond to the pump discharge orientation as indicated on the Drawings.

2. The impeller shall be single suction, enclosed, two or four vane, radial flow design with well rounded leading vanes and then tapered toward the trailing edge for a circular flow pattern. The design of the impeller and the shape of the blades shall be such that rags or similar materials will not clog the pump or seriously affect the efficiency. The waterways through the impeller shall have extremely smooth contours, devoid of sharp corners, to prevent rags or stringy, fibrous material from catching or clogging.

3. Impeller shall be designed to minimize clogging and shall be capable of passing a minimum 3” diameter solid sphere.

4. The impeller shall be keyed to the shaft and firmly held in place by a streamlined 316 stainless steel locking device. The arrangement shall be such

that the impeller cannot be loosened by torque from either forward or reverse rotation.

D. Mechanical Seal

1. The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two (2) sections with registered fit.

2. The housing shall be recessed into the pump back head and securely fastened thereto with stainless steel cap screws. The inside of the seal housing shall be tapered to facilitate the replacement of the seal parts.

3. The seal shall be a double seal, with the mating surfaces lapped to a flatness tolerance of one light band.

4. The rotating member shall be held in mating position with the stationary carbons by a stainless steel spring.

5. The seal housing with assembled parts shall be so constructed as to be readily removable from the shaft as a unit, and shall be provided with tapped jackscrew openings to assist in removing it from the back head.

E. Pump Bearings

1. The pump shall be provided with radial and thrust anti-friction ball or tapered-spherical roller type bearings of ample size to carry all loads imposed under continuous operation without overheating.

2. The bearing housing shall be of dust-proof design, incorporating lip-type grease seals in contact with the shaft to prevent the entrance of contaminants.

3. The bearings shall be grease lubricated and a relief port lip seal shall be provided so that excessive grease pressure will not damage the bearings. The bearings shall be provided with tapped openings for the addition of lubricant and draining.

4. The bearings shall be designed in accordance with AFBMA standards for a minimum B-10 life of 40,000 hours at the most extreme operating points on the pump performance curve and a minimum of 100,000 hours at the primary duty point.

F. Bearing Frame

1. The pump bearing frame shall be made of ASTM A48 Class 30 cast iron material. The bearing frame shall be shoulder fitted, accurately centered and rigidly fixed to the pump casing and backplate. The bearing frame shall contain jacking bolts and shims for the axial adjustment of the rotating element when necessary to provide the manufacturer's recommended clearance between the impeller and suction cover over the life of the pump.

2. The pump bearing frame shall be designed so that the complete rotating element can be removed from the pump casing without disconnecting of the suction or discharge piping.

G. Pump Support

1. The base shall be fabricated of steel or integrally cast with the suction elbow.

2. The base shall be anchored to the existing concrete pad using a minimum of four stainless steel anchor bolts.

   a. Surface damage to existing concrete pad shall be repaired and made level where necessary by use of TNEMIC Series 217 MortarCrete or Equal.

3. Support shall provide easy access to the stuffing box, bearing frame, and coupling.

4. Base shall have adequate horizontal dimensions, foundation contact area, anchorage facilities and shall be of sufficient height so that the suction elbow will not touch the floor or foundation upon which the pump is mounted.

5. The pump support system shall be of sufficient size, strength, and rigidity to support the unit and prevent harmful or damaging vibration. Base shall safely withstand all stresses imposed thereon by vibration, shock and all possible direct and eccentric loads.

6. Pump base / stand shall be customized to ensure pump suction and discharge ends lines up within the existing piping configuration. Contractor to field verify dimensions and coordinate with Manufacturer.

2.5 SHAFTING

A. The pump shaft shall be made from high grade heat treated alloy steel, rigid shaft type, of sufficient size to transmit the full driver horsepower with a liberal safety factor, accurately machined over its entire length and free from any harmful or damaging vibrations. The pump shaft shall include a tapered end for positive alignment and ease of removal at the impeller hub.

2.6 MOTOR

A. Motor shall be 20 HP/1800 RPM premium efficiency rated for 3 phase, 460 volts, 60 hertz electrical service and shall conform to all applicable requirements of Div. 16.

B. Motors shall be inverter rated duty, with additional details of their design as specified in Division 16.

C. The motors shall have capacity sufficient to operate the pumps throughout the operating range without exceeding the nameplate rating for current and power, unless otherwise is specifically indicated.

D. Vertical motors shall be provided with radial keyways to absorb thrust caused by shafting.

E. Motor shall be provided with lifting lugs.

F. Immersible Motor

1. The motor shall be immersible for up to three (3) weeks at a depth of thirty feet (30') of water without damage from leakage.

2. Motor shall be capable of operating in an immersed state without damage to the pump or motor.

3. After returning from an immersed state, the motor shall be capable of being restarted without any service to the motor.

4. The upper and lower shaft extensions shall be sealed with specially designed PTFE rotating lip seals and all casting-to-casting interfaces shall be sealed with Viton O-rings.

5. Leads shall be terminated in a cast connection box, designed to exclude moisture, and all leads shall be clearly identified.

6. Where required for sealing, all bolts shall be provided with Neoprene-backed washers.

7. A slinger ring shall be provided on the lower shaft extension to further reduce the possibility of water entering the motor.

8. Each motor shall have at least one (1) normally closed, automatically resetting thermostat per phase, suitable for a 120 VAC 2-amp load.

2.7 MOTOR SUPPORT

A. The motor shall be mounted and supported by a fabricated steel support stand with adequately sized service openings providing easy access to the coupling flange. The support shall be ribbed as necessary to prevent excessive deflection.

2.8 SURFACE PREPARATION AND PAINTING

A. Surface preparation and prime and finish painting is provided under this Section. Surface preparation shall be SSPC-SP6, commercial blast. Shop prime and finish coating systems shall be the manufacturer's recommended coating systems for the intended service.

B. A minimum of one quart of touch-up paint shall be provided with the equipment.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of pumps, pipes, valves and appurtenances by the General Contractor shall be strictly in accordance with the recommendations and instructions of the manufacturer and located as shown on the Drawings or as approved by the Engineer. Supervision of installation and testing of equipment by the manufacturer's representative shall be provided in accordance with the requirements of this Section.

B. It shall be the responsibility of the Contractor to coordinate the work included under this Section with other related work specified herein to ensure that all the equipment

shall operate to perform the designated functions in a proper and acceptable manner.

C. Level base by means of steel wedges (steel plates and steel shims). Wedge taper not greater than ¼ inch per foot. Use double wedges to provide a level-bearing surface for the pump and driver base. Accomplish wedging so that there is no change of level or springing of the baseplate when the anchor bolts are tightened.

D. Adjust pump assemblies such that the driving units are properly aligned, plumb, and level with the driven units and all interconnecting shafts and couplings. Do not compensate for misalignment by use of flexible couplings.

E. After the pump and driver have been set in position, aligned, and shimmed to the proper elevation, grout the space between the bottom of the baseplate and the concrete foundation with a poured, non-shrinking grout of the proper category. Remove wedges after grout is set and pack void with grout.

F. After the complete pumping units and appurtenant equipment have been installed, and the units have been inspected, tested, adjusted and placed in proper operating condition under the direct observation of the pump manufacturer's representative, the pumping equipment shall be field-tested by the Contractor in the presence of the Engineer. The tests shall demonstrate fitness for the service specified and the ability of the pumping units to operate without vibration or overheating when operated to meet the performance requirements specified.

G. Connect suction and discharge piping without imposing strain to pump flanges.

H. Anchor bolts shall be accurately placed using equipment templates.

3.2 FIELD QUALITY CONTROL

A. General

1. Testing shall not be conducted until such time that installation is complete and ready for testing.

2. The manufacturer shall provide a factory trained technician for a minimum of one four-hour day of field service for installation and start-up supervision, as specified in Section 11000. Services shall include, but not necessarily be limited to, inspection of the completed installation to ensure that it has been performed in accordance with the manufacturer’s instructions and recommendations, and supervision of all testing.

B. Performance Testing

1. Pumps shall be field tested at a minimum of seven head/capacity points including shutoff head and maximum capacity as required to ensure pumps are tracking along the certified pump curve. Provide submittal with test results.

2. Each of the pumps shall be run at maximum capacity for 24 hours (without malfunction) prior to acceptance.

3. Record driving motor voltage and amperage measured for each phase.

4. Adjust, realign, or modify units and retest, if necessary.

5. All defects or defective equipment revealed by or noted during the performance testing shall be corrected or replaced promptly at the expense of the Contractor, and, if necessary, the tests shall be repeated until satisfactory results are obtained. The Contractor shall furnish all labor, piping, equipment and materials necessary for testing.

C. In the event the equipment fails to meet any of the requirements specified above, the necessary changes shall be made and the equipment retested. If the equipment remains unable to meet the specified requirements to the satisfaction of the Owner, the equipment shall be removed and replaced with satisfactory equipment at no cost to the Owner.

3.3 MANUFACTURER'S SERVICES

A. The Contractor shall obtain be responsible for coordinating the services of a qualified field service engineer provided by the manufacturer for start-up, inspection, and testing as specified under Section 11000, Equipment - General.

B. The Contractor shall provide the Owner with a minimum 7 days written notice of planned operator training.

C. The manufacturer's technician shall prepare a written report specifying that the equipment is installed according to the manufacturer's recommendations and is ready for permanent operation. The report shall also confirm that nothing in the installation will render the manufacturer's warranty null and void.

D. The manufacturer shall provide the services of a factory-trained technician to train the Owner on the operation, calibration and maintenance of equipment supplied under this Section in accordance with the requirements of Section 11000.

E. A minimum of one (1) day of field service shall be provided by an authorized, factory trained representative of the pump manufacturer for installation and start-up supervision. Services shall include, but not necessarily be limited to, inspection of the completed installation to ensure that it has been performed in accordance with the manufacturer's instructions and recommendations, and supervision of all field testing.

F. In addition, a manufacturer's field service representative shall be provided for a separate additional period of one day, to provide operator training in the operation and maintenance of all equipment provided under this Section, as well as activation of the Warranty.

G. Again, training shall be conducted separate from the specified start-up, and a total minimum number of on-site visits required by the pump representative shall be two (2) days in total.

3.4 WARRANTY

A. The manufacturer of the pumping units shall provide a written warranty covering each entire pumping unit as described herein.

B. In the event of problems caused by defects in materials and/or workmanship, the Manufacturer and the Contractor shall promptly repair or replace the defective materials or workmanship at no cost to the Owner.

C. Final Acceptance of all equipment furnished under these Specifications will be withheld until after the installation and field testing by the Contractor in the presence of the Owner. The Manufacturer shall guarantee the equipment against defects of any kind for a period of five (5) years after final testing and acceptance and shall cover 100% of the cost of repairs for parts and labor.

TABLE 1
Performance Data

Design Parameter	**Brook Street Pump Station**
Manufacturer / Model Number	Smith & Loveless, Inc. / 4C3
Service	Raw Sewage (Collection System), Continuous/Intermittent Operation
Maximum Liquid temperature	75°F
Pump Type	Vertical Close-Coupled Flooded Suction Immersible Non-Clog
Number of Pumps to be Provided	1 (One)
Number of Additional Spare Pumps to be Furnished	None
Pump Suction Diameter	6" (includes 4” x 6” suction elbow)
Pump Discharge Diameter	4"
Maximum Solids Size	3.0”
Impeller Diameter	9.0”
Rated Speed	1800 rpm
Motor Size (Non-Overloaded Across Entire Pump Curve)	20 hp
Power Requirements	460 V/3 Ph/60 Hz
Motor Type	Immersible. (Up to 3 weeks under 30’ of water)'
Peak Flow Design Point	475 gpm @ 72' TDH
Pump Stand	Custom Pump Stand

END OF SECTION

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SECTION 13420

INSTRUMENTATION

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This section is part of filed Sub-Bid – Electrical.

1.2 SUMMARY

A. Section Includes

1. Installation and start-up of instrumentation provided under this section.

B. Related Sections

1. Refer to Division 11 for equipment furnished by other sections but requiring wiring diagrams developed under this section to reflect complete integration of the systems, instrumentation, interlocking, interfacing and installation under this section.

2. Refer to Division 16, Electrical for wiring standards and practices.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications - Firms regularly engaged in the manufacture of instrumentation systems (the "System Supplier"), whose products have functioned satisfactorily in similar service, and has demonstrated proficiency and extensive experience with current technology.

B. Installer’s Qualifications - Firms regularly engaged in the installation, calibration, and adjustment of instrumentation systems, with a minimum of five years of experience, whose systems have functioned satisfactorily in similar service and have demonstrated proficiency and extensive experience with current technology.

1.4 SUBMITTALS

A. Provide complete equipment specifications, details of connections, wiring, range and dimensions. Submittals consisting of only general sales literature will not be acceptable. Shop drawings shall be bound in separate three ring binders with an index and section, sub-section, etc., dividers. The dividers shall be arranged so its individual tabs can locate each item being referenced.

B. Submit detailed information for each instrument or control device, including manufacturer's descriptive literature and a specific data sheet for each device which shall include as a minimum:

1. Product (item) name used herein and Tag number as shown on the Contract Drawings.

2. Manufacturers complete model number.

3. Location of the device.

4. Input - output characteristics.

5. Range, size, and graduations.

6. Physical size with dimensions, enclosure NEMA classification and mounting details.

7. Materials of construction of all components.

8. Calibration sheet verifying the instrument is working properly over the complete range.

C. Exceptions to the Specifications or Drawings shall be clearly defined by the System Supplier. Data shall contain sufficient details so the Engineer may make a proper evaluation.

1.5 PRODUCT HANDLING

A. Identification

1. Each component shall be tagged per the users standard numbering system or as defined herein and in the contract drawings. To identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

2. A permanent stainless steel tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment supplied under this section. In the case where any supplied instrument is too small or of such a material as to make a stainless steel tag impossible to attach, a method of indelible marking, demonstrating the intent of this paragraph shall be submitted to the engineer for approval.

B. Storage

1. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, the System Supplier at his own cost and expense shall repair such damage. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the System Supplier, or the System Supplier at his own expense shall replace the apparatus.

1.6 INSTRUMENTATION GENERAL

A. Type

1. Instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals that are established standards for the water and wastewater industries.

2. Electronic instrumentation shall be of the solid-state type. Analog control signals shall be linear and be industry standard currents of 4 to 20 mA DC (milliampere direct current), however, signals between instruments within the same panel or cabinet may be 1-5 VDC (volts direct current), or the like. No zero based signals shall be allowed.

3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standards signals for remote transmission. No zero-based signals shall be allowed.

4. Instruments shall be provided with stainless steel mounting hardware and/or galvanized steel floor stands, wall brackets, or instrument racks as appropriate for each location.

5. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.

6. Indicators and recorder readouts shall be linear in the process units.

7. Transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to ± 2 percent.

8. Electronic equipment shall be of the manufacturer's latest design. Circuit boards and associated components shall have suitable conformal coating to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose to assure optimum long-term performance and dependability over normally anticipated atmospheric conditions of temperature, pressure and humidity. The field-mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

9. Equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models that are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.

1.7 ELECTRICAL

A. Equipment shall be designed to operate on a 60 Hertz alternating current power source at a nominal 110 volts, plus or minus 10 percent except where specifically noted. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

B. Analog transmitter and controller outputs shall be 4-20 milliamps into a minimum load range of 0-750 ohms, unless specifically noted otherwise.

C. Switches shall have double-pole, double-throw contacts rated at a minimum of 600 VA unless specifically noted otherwise.

D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

E. Equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation upon manual resetting when power is restored.

1.8 LIGHTNING/SURGE PROTECTION

A. General - Lightning/surge protection shall be provided to protect the system from inducted surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance-free and self-restoring. Instruments shall be housed in a suitable metallic case, properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground, and where practical each ground wire run individually and insulated from each other. These protectors shall be mounted within the instrument enclosure or a separate NEMA 4X junction box coupled to the enclosure. The units shall be as manufactured by EDCO, MCG Electronics, MTL Electronics, Or equal.

1. Power Supply - Protection of all instrument power supply lines shall be provided. Cabinet(s)/Panel(s) and groups of field instruments, as approved by the Engineer shall be protected by isolation transformers and surge suppressors. Individual gas-tube surge suppressors shall protect individual field instruments.

2. Communication Line - Protection of all communication lines shall be provided. Protection devices shall be installed at both ends and as close to the equipment being protected as possible. Protection devices shall provide the equipment manufacturer’s recommended protection levels but shall not interfere with communication. The protection devices shall be standard devices listed by the protection device manufacturer as suitable for the specific type of communication line.

PART 2 PRODUCTS

2.1 PUMP CONTROLLERS

A. Controller:

1. Existing Brook Street Pump Station Pump Controllers shall be utilized.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The location of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as requested by the Engineer. Furnish all labor and materials necessary to complete the work in an approved manner.

B. The System Supplier shall make all necessary mechanical changes to install new instrumentation equipment provided under this Contract. This work includes all fittings, fabrications, supports, guides, restraints, bolting, gaskets, and accessories. All work shall be done in a workmanlike manner.

C. The instrumentation drawings indicate the intent of the interconnections between the individual instruments. Any exceptions should be noted.

D. Work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances, and regulations, the System Supplier shall bear full responsibility for such violations and assume all costs arising there from.

E. Equipment used in areas designated as hazardous shall be designed for the Class, Group and Division as required on the Electrical Drawings for the locations. All installations shall be in strict accordance with codes.

F. Instrument cabinets located outdoors or in unheated locations shall be provided with heating and/or cooling devices as necessary to maintain all instruments and or electronics installed in those cabinets within their design temperature limits.

G. Brackets and hangers required for equipment mounting shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The System Supplier shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the System Supplier shall be required to ship his material in sections sized to permit passing through restricted areas in the building. The System Supplier shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure, and panel to ensure proper space and access (front, rear, side).

I. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment, but in no case shall more than one ground point be employed for each shield.

J. Lifting rings from cabinets/assemblies shall be removed. Hole plugs shall be provided for the holes of the same color as the cabinet.

K. The System Supplier shall coordinate the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to ensure a satisfactory functioning installation.

3.2 SYSTEM TESTS AND ACCEPTANCE

A. After the equipment has been delivered and installed at the site, a field acceptance test shall be performed to verify the integrity of the system. The Engineer shall witness the test. Satisfactory completion of the test, as approved in writing by the Engineer, shall constitute conditional approval of the system. The system must operate without failure for a period of 100 hours before this test will be considered successful, and the system fully accepted.

B. Before this test is started, the System Supplier shall satisfy himself that the system is operating correctly with live plant data.

C. Any malfunctions during the test shall be analyzed and corrections made by the System Supplier. The Owner's Project Representative will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

3.3 FIELD TESTS

A. The System Supplier shall furnish the services of the Manufacturer's servicemen, all special tools, calibration equipment and labor to perform the tests. Certified copies of the tests shall be furnished in duplicate to the Engineer.

B. Following connection, checkout, and final adjustment of all panels, instruments, meters, monitoring, and control devices, a performance check shall be made on each. Analog inputs shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale, as required. All status and alarm switches as well as all monitoring and control functions shall also be checked. Each device on the Electrical Schematic\Logic Diagrams must be signed-off by the Engineer as being acceptable.

C. If, during running of the tests, one or more points appear to be out by more than the specified amount, the Manufacturer's servicemen shall make such adjustments or alternations as are necessary to bring equipment up to specification performance. Following such adjustments, the tests shall be repeated for all specified points to ensure compliance.

3.4 INSTRUCTION - STAFF TRAINING

A. All plant personnel will need training on the instrument systems. The System Supplier shall be responsible for providing detailed Operation and Maintenance (O&M) Manuals. The O&M Manuals shall include specific details of equipment supplied and details of operations specified to this project. The training will be conducted at the facilities.

B. The O&M Manuals shall include descriptions of all equipment, the nature and intended modes of operation, testing procedures of all units in the System, and safety measures to be taken in operation. All necessary procedures and methods for effective operation of the System shall be included.

C. O&M Manuals shall include record drawings and instructions necessary for the planned maintenance of all equipment in the system. The O&M Manuals will incorporate maintenance procedures and schedules, and they will coordinate and be cross-referenced to detailed operation procedures provided by the manufacturers.

D. The system training shall be structured such that the operating personnel will understand the system's operation, and the functions available in the system. The amount of training will be a minimum of 1 day, scheduled as convenient for the Owner. Preventive and corrective maintenance of hardware shall be presented.

3.5 MAINTENANCE CONTRACT

A. Maintenance Contract: After the final acceptance of the instrument system, the vendor shall furnish to the Owner a one-year contract for complete maintenance service of the instrument system. The services under the Maintenance Contract will take place at the plant site. The contract will include preventive maintenance and calibration, emergency service repairs, replacement of defective or worn parts or device and accessories and expendable items, and verification of correct software operation. The service shall be performed by the manufacturer and shall provide for a minimum of one inspection during the contract year. The service technicians shall be equipped with all tools and test equipment necessary for calibration and repair.

B. Preventive or corrective maintenance shall include a systematic and periodic examination of each device supplied under this section. This equipment shall be calibrated, cleaned, lubricated, adjusted or aligned to insure proper operation. This preventive maintenance shall be rendered generally such that each component will be tested at least four times annually. The calibration shall include the simulation of the process variable system where applicable.

C. Emergency Service: Emergency service shall be provided during normal working hours (8:00 a.m. to 5:00 p.m. Monday through Friday) to correct any hardware defect or failure and to apply the appropriate corrective action to restore the defective device to the manufacturer's original specifications or tolerances. A qualified instrument technician directly employed by the manufacturer within 24 hours after notification shall provide this service.

D. Parts: As part of this maintenance service, all parts shall be provided by the manufacturer at no additional cost. Transfer of ownership shall take place when a part is installed in the Owner's instrumentation or other equipment covered by the Contract.

PART 4 SYSTEM DETAILS

4.1 SYSTEM DETAILS

A. Unless specifically stated otherwise, the System Supplier shall be responsible for providing all instrumentation, control equipment and auxiliary devices necessary to perform the functions specified herein and as shown and described on the contract drawings.

B. Any auxiliary devices such as lightning/surge protectors, relays, times, signal isolators, signal boosters, etc., which are necessary for complete operation of the system, or to perform the functions specified, shall be included, whether or not they are specifically shown or tabulated on the diagrams.

END OF SECTION

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SECTION 15050

PIPING - GENERAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Permit requirements and documentation
2. Sleeves and seals for all wall, floor and roof penetrations
3. Escutcheons
4. Wall Pipes
5. Anchor bolts
6. Pipe and equipment coatings
7. Piping installation
8. Testing
9. Cleaning
10. Pressure testing
11. Disinfection

B. Related Sections

1. Section 09900 - Painting
2. Section 15060 - Hangers and Supports
3. Section 15075 - Mechanical Identification
4. Yard piping for process piping, utility services, sanitary, storm, and roof drainage systems outside the building is included in Division 2.

1.2 REFERENCES

A. ASTM A778 – Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

B. ASTM A36 – Specification for Carbon Structural Steel

C. American Water Works Association, AWWA C651, AWWA Standard for Disinfecting Water Mains

D. Massachusetts State Plumbing Code – 248 CMR 14 (13)(a) Disinfection of Potable Water Systems

1.3 SUBMITTALS

A. Material specifications and shop drawings for all materials and equipment furnished under this Section

B. Layout drawing for hangers and supports

C. Certificates of Compliance on all pipe materials

D. Pipeline testing and disinfection procedures

1.4 QUALITY ASSURANCE

A. The location of all equipment, fixtures, and piping is considered to be approximate only and the Engineer has the right to change at any time before the work is installed, the position of equipment and piping to meet structural conditions, avoid interferences, provide proper clearances or for other sufficient causes. Such changes shall be made without additional expense to the Owner.

B. Secure all permits and pay all fees required to carry out the piping work. Comply with all laws, ordinances, codes, rules, and regulations of the local and state authorities having jurisdiction over any of the work specified herein. Where provisions of the Contract are in conflict with the codes, the more stringent of either the codes or the Contract Documents shall govern.

C. The drawings and diagrammatics show the pipe sizes and general routing. Offsets and fittings required to avoid field interferences and provide improved layout shall be provided at no additional cost to the Owner.

D. All pipe, tube, hose, and fittings in a given specification section shall be the product of a single manufacturer who is experienced in the manufacture of the materials to be furnished. The manufacturer must have provided materials which have be successfully installed and operated for at least 5 years in a similar application.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before installing, and no piece shall be installed which is found to be defective. Any damage to the pipe linings or coatings shall be repaired as directed by the Engineer at no additional cost to the Owner.

B. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before installing, shall be kept clean until they are used in the work, and when installed shall conform to the lines, grades and dimensions required.

C. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sleeves and Seals - Furnish all sleeves required under this Division. Coordinate the sleeve locations and elevations for placement.

1. Sleeves will be required at the locations shown on the Drawings or as specified herein. The type of wall penetration shown on the Drawings shall govern over the summary presented herein.

2. Sleeves shall be Schedule 5S stainless steel in accordance with ASTM A-778 with seep rings. Seep rings shall be welded continuous, placed on the center of the sleeve and project 3 inches. Floor sleeves shall be 3 inches longer than the floor slab depth and shall project 3 inches above finish floor level for housekeeping purposes. Wall sleeves shall be the same length as the wall thickness. Sleeves passing through partition walls do not require seep rings.

3. Sleeves for carrier pipes 1 inch diameter and less shall be Type WSK as manufactured by O.Z. Electrical Manufacturing Company, Brooklyn, NY, Wall-Seal by Dresser Manufacturing, Thunderline, or equal.

4. HVAC Sleeves:

   a. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

   b. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

   c. Sleeves for Round Ductwork: Galvanized steel.

   d. Sleeves for Rectangular Ductwork: Galvanized steel or wood.

   e. Sealant: Acrylic.

5. Sleeves with seals as described hereinafter shall be used for all carrier pipes larger than 1 inch in diameter. Seals between steel sleeve and carrier pipe shall be made using "Linkseal" as manufactured by Thunderline Corporation, Pen-Sealas manufactured by Proco Products, Innerlynx or equal. Sizing of sleeves, selection of link model numbers and sizes shall be in strict accordance with the manufacturer's instructions to ensure watertightness.

   a. Same environment on both sides of wall or floor - sleeves are required. No seal between the pipe and sleeve is required in these locations.

   b. Pipes passing through foundation walls with soil on both sides - pipes shall pass through an oversized opening. Sleeves with seals are not required at these locations.

   c. Sanitary soil pipes, floor drain pipes, and roof drain pipes passing through walls and floors between areas of different environments - water stopped sleeves shall be used and sealed as described above.

6. Pipes penetrating a concrete floor poured on soil above grade shall be poured in place. Pipes shall be fully isolated with full depth, ¼ inch thick, self-expanding cork or other bond-breaking material held securely in place during concrete placement. The annular space at finish floor shall be caulked.

B. Escutcheons - Where uncovered pipe passes through finished walls or ceilings, a chrome plated escutcheon shall be provided.

C. Wall Pipes - Wall pipes shall be provided where called for on the Drawings. Wall pipes shall be provided with a 3 inch high seep ring welded continuous and placed on the center of the pipe. Seep ring shall be ASTM A36 steel, minimum ¼ inch thick. Wall pipe interior shall be finished equal to main line with end connections as required (MJ, Flanged, PE, Push-on Bell).

D. Anchor Bolts - Anchor bolts, nuts, washers, and bolt sleeves shall be Type 316 stainless steel. Expansion bolts shall be "Thunderstuds," as manufactured by Unifast Industries, Inc., Hauppauge, NY, Redhead "Wedge Anchors" as manufactured by ITT Phillips; Michigan City, Indiana or Molly parabolt as manufactured by USM Corporation, Shelton, CT. All expansion bolts and associated hardware shall be stainless steel.

2.2 FINISHES

A. Pipe and Equipment Coatings - The prime and field applied coatings shall conform to the requirements of Section 09900. Prime coats must be compatible with the paint system approved for this project.

1. Exposed piping shall be painted in accordance with the individual pipe specification section and Section 09900.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean and prepare pipe joints to be free of scale, dirt, and debris prior to connections.

B. Comply with the surface preparation requirements outlined in Section 09900 for all piping, supports and hangers.

3.2 INSTALLATION

A. Work shall be installed in accordance with the manufacturer's printed instructions and shall be plumb and true to line. Install piping as close to walls, and ceilings as possible yet facilitating maintenance and access to valves and devices. In general, piping systems shall parallel walls, partitions, and structural members. Offsets and fittings to accomplish a neat and workmanlike installation shall be provided at no additional cost to the Owner. Piping shall be installed true to the grades required as shown on the Drawings.

B. Take care that stresses are not imposed on the pipe during installation.

C. Concrete inserts for hangers and supports shall be furnished and installed in the concrete as it is placed. The inserts shall be set in accordance with the requirements of the piping layout and joint method and their locations shall be verified from approved piping layout drawings and the structural drawings. Layouts for hanger and supports shall be submitted to the Engineer for approval. Pipe hangers and supports shall conform to the requirements of Section 15060.

D. All valves, fittings, and appurtenances needed on the pipelines shall be set and jointed as indicated on the Drawings or as required.

E. Equipment Connections - Provide unions and control valves on services to equipment provided under other Sections. All valves are to be installed in the upright position. Valves shall be installed and located so they can be operated easily and shall be located adjacent to the equipment.

F. Unions - All piping 2 inches and smaller shall have a sufficient number of unions to allow convenient removal of piping and shall be as approved by the Engineer.

G. Cutting and Patching - Sleeves not initially set in the work shall be cut in place with permission of the Engineer. This work shall be performed by workmen competent to do the work and equipped with proper hand tools. Power tools with the exception of core boring machines shall not be used.

H. Welding - Welding shall only be performed by certified welders tested in the position applicable to the work. Welding shall be performed in accordance with AWS standards. Copies of welding certifications shall be provided to the Engineer.

I. Pipe identification and marking shall be in accordance with Section 15075.

3.3 REPAIR/RESTORATION

A. During the course of the Work, protect all materials, fixtures, and equipment from damage. Any damage to piping, linings or coatings shall be repaired to the satisfaction of the Engineer or replaced.

3.4 CLEANING

A. At the completion of the Work, thoroughly clean all piping and equipment installed. Remove all concrete, stickers, rust stains, foreign matter and discoloration. Piping and equipment shall be in a thoroughly clean condition and ready for finish painting.

B. All potable water piping shall be thoroughly flushed and disinfected prior to placing in service in a manner approved by the Engineer.

3.5 PRESSURE TESTING

A. Testing - Test all piping systems in accordance with the piping section requirements or to the code applicable to the location where the work is performed. Pipes shall hold pressure without the addition of water or additional pumping. Additional tests or methods may be required by local ordinances or inspection authorities. Tests shall be repeated as necessary to make the systems tight and accepted. Provide all water, air, or gas, apparatus, gauges, and materials necessary for performing tests.

B. Provide all equipment, materials, and apparatus to conduct pressure tests as required by code or the individual piping sections. All tests shall be witnessed by the Engineer. Any leaks shall be repaired and the pipe retested to the Engineer's satisfaction.

C. Test pressure and duration shall be as specified in the individual piping sections.

END OF SECTION

SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Plastic Pipe Markers
2. Valve Tags
3. Plastic Equipment Markers
4. Plasticized Tags

B. Related Sections

1. Section 09900 - Painting
2. Division 15 Sections which specify pipe and valve marking and identification.

1.2 REFERENCES

A. ANSI Standards - Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.3 SUBMITTALS

A. Manufacturer's technical product data and installation instructions for each identification material and device required.

B. Samples of each color, lettering style and other graphic representation required for each identification material or system.

C. Valve schedule for each piping system, typewritten and reproduced on 8½″ x 11″ bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves that are intended for emergency shut-off and similar special uses, by special “flags”, in margin of schedule.

1.4 QUALITY ASSURANCE

A. Mechanical identification materials shall be provided by firms regularly engaged in manufacture of identification devices of types and sizes required and whose products have been in satisfactory use in similar service for not less than 5 years.

1.5 MAINTENANCE

A. Extra materials

1. Furnish minimum of 5% extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.

2. Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in extra stock, along with required stock of stenciling paints and applicators.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide mechanical identification materials of one of the following or equal:

1. Allen Systems, Inc.

2. Brady (W.H.) Co.; Signmark Div.

3. Seton Name Plate Corp.

2.2 MATERIALS

A. Mechanical Identification Materials

1. Provide manufacturer's standard products of categories and types required for each application as referenced in other Division 15 sections. Where more than single type is specified for application, selection is installer's option, but provide single selection for each product category.

B. Plastic Pipe Markers

1. Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1.

2. Furnish 1 inch thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125°F (52°C) or greater. Cut length to extend 2 inches beyond each end of plastic pipe marker.

3. For external diameters less than 6 inch (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:

a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.

4. For external diameters of 6 inch and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:

a. Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless steel bands.

5. Color coding shall apply to the background color of the identification markers. Color code all pipe markers in accordance with Section 09900.

6. Manufacturer's standard pre-printed nomenclature that best describes piping system in each instance, as selected by the Engineer in cases of variance with names as shown or specified. Custom wording shall be provided when no standard nomenclature is available.

7. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as a separate unit of plastic.

8. Pipe markers shall be minimum 2 inches wide.

C. Valve and Gate Tags

1. Provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in ¼ inch high letters and sequenced valve numbers ½ inch high, and with 5/32 inch hole for fastener.

   a. Provide 1-1/2 inch diameter tags, except as otherwise indicated.

   b. Provide size and shape as specified or scheduled for each piping system.

   c. Fill tag engraving with black enamel.

2. Provide manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

3. Provide manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include 1/8-inch center hole to allow attachment.

D. Plastic Equipment Markers

1. Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code:

   a. Green - Cooling equipment and components.

   b. Yellow - Heating equipment and components.

   c. Yellow/Green - Combination cooling and heating equipment and components.

   d. Blue - Equipment and components that do not meet any of the above criteria.

   e. For hazardous equipment, use colors and designs recommended by ANSI A13.1.

2. Include the following, matching terminology on schedules as closely as possible:

   a. Name and plan number.

b. Equipment service.

c. Design capacity.

d. Other design parameters such as pressure drop, entering and leaving conditions, rpm, etc.

3. Provide approximate 2-1/2 inch by 4 inch markers for control devices, dampers, and valves; and 4-1/2 inch by 6 inch for equipment.

E. Plasticized Tags

1. Manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matt finish suitable for writing approximately 3-1/4 inch by 5-5/8 inch, with brass grommets and wire fasteners and with appropriate pre-printed wording including large-size primary wording (as examples; DANGER, CAUTION, DO NOT OPERATE).

F. Lettering and Graphics

1. Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.

2. Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples; Boiler No. 3, Air Supply No. 1H, Standpipe F12).

PART 3 EXECUTION

3.1 INSTALLATION

A. Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of removable concealment, if any.

B. Ductwork Identification

1. General - Identify air supply, return, exhaust, intake and relief ductwork with duct markers; or provide stenciled signs and arrows, showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork color).

2. Location - In each space where ductwork is exposed, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50 foot spacing along exposed runs.

3. Access Doors - Provide duct markers or stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment)

and other maintenance and operating instructions, and appropriate safety and procedural information.

4. Concealed Doors - Where access doors are concealed plasticized tags may be installed for identification in lieu of specified signs, at Installer's option.

C. Piping System Identification

1. Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

   a. Plastic pipe markers, with application system as indicated under "Materials" in this section. Install on pipe insulation segment where required for hot non-insulated pipes.

2. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

   a. Near each valve and control device.

   b. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

   c. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.

   d. At access doors, manholes and similar access points that permit view of concealed piping.

   e. Near major equipment items and other points of origination and termination.

   f. Spaced intermediately at maximum spacing of 50 feet along each piping run, except reduce spacing to 25 feet in congested areas of piping and equipment.

D. Valve Identification

1. Provide valve tag on every valve, gate, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.

E. Mechanical Equipment Identification

1. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

a. Main control and operating valves, including safety devices and hazardous units.

b. Meters, gauges, thermometers and similar units.

c. Pumps, compressors, condensers and similar motor-driven units.

d. Fans, blowers, primary balancing dampers and mixing boxes.

e. Packaged HVAC central-station or zone-type units.

f. Tanks and pressure vessels.

g. Strainers, filters, water treatment systems and similar equipment.

2. Where lettering larger than 1 inch height is needed for proper identification, because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved plastic, at Installer's option.

3. Minimum ¼ inch high lettering for name of unit where viewing distance is less than 2 feet, ½ inch high for distances up to 6 feet and proportionately larger lettering for greater distances. Provide secondary lettering of 67% to 75% of size of the principal lettering.

4. In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

5. At Installer's option, where equipment to be identified is concealed, plasticized tags may be installed within concealed space to reduce amount of text in exposed sign (outside concealment).

a. Operational valves and similar minor equipment items located in non-occupied spaces (including machine rooms) may, at Installer's option, be identified by installation of plasticized tags in lieu of engraved plastic signs.

3.2 ADJUSTING

A. Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.3 CLEANING

A. Clean face of identification devices.

END OF SECTION

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SECTION 15110

VALVES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Check Valves

B. Related Sections

1. Section 09900 - Painting
2. Section 13420 – Instrumentation

1.2 REFERENCES

A. ASTM A126 - Specifications for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

B. ASTM B62 - Specification for Composition Bronze or Ounce Metal Castings

C. ASTM D1784 - Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D. ASTM D4101 - Specification for Propylene Plastic Injection and Extrusion Materials

E. AWWA C550 – Standard for Protective Interior Coatings for Valves and Hydrants

F. AWWA C800 – Standard for Underground Service Line Valves and Fittings

1.3 SUBMITTALS

A. Product data including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

B. Wiring diagrams, product and performance data for electrical and pneumatic actuators, electric check valves, solenoid valves and pump directors.

C. Performance and sizing data for air release valves including manufacturer's recommended sizing requirements.

D. Valve operating and seating torques for all valves equipped with electric or pneumatic actuators.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Ensure valves are dry and internally protected against rust and corrosion.
2. Protect valve ends against damage to threads, flange faces, and weld-end preps.

3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open: and block swing check valves in either closed or open position.

B. Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.

2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

C. Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

1.5 OPERATION AND MAINTENANCE MANUALS

A. Provide O&M manuals for all valves in accordance with section 01770.

PART 2 PRODUCTS

2.1 GENERAL

A. Pressure and Temperature Ratings - As scheduled and required to suit.

B. Sizes - Same size as upstream pipe, unless otherwise indicated.

C. Extended Stems - Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

D. Bypass and Drain Connections - Comply with MSS SP-45 bypass and drain connections.

E. Valves shall have the same end connections and an equivalent or higher pressure rating as the pipeline in which it is installed.

2.2 CHECK VALVES

A. Swing Check Valves, 2½ inch and Larger

1. Check valves shall be all iron body, bronze mounted, full opening swing type. Valve clapper shall swing completely clear of the waterway when valve is full open, permitting a "full flow" thru the valve equal to the nominal pipe diameter. Check valves shall comply with AWWA Standard C-508 latest revision.

2. Check Valves shall be rated at 175 psi water working pressure, 350 psi hydrostatic test for structural soundness. Seat tightness at rated working pressure shall be in accordance with AWWA C508.

3. Check valves shall be furnished with 125# ANSI flanged ends.

4. All cast iron shall conform to ASTM-A-126 Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Clapper shall be all bronze for sizes through 4 inch and cast iron, bronze faced for sizes 6 inch and larger. Hinge pins shall be 18-8 Stainless Steel rotating in bronze plugs. Bolts shall be electro-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307 and A-563, respectively.

5. Check valves shall be constructed to permit top entry for complete removal of internal components without removing the valve from the line. Glands shall be O-rings. Check valves shall be equipped with adjustable outside lever and spring or lever and weight to accomplish faster closing and to minimize slamming effect. Bosses shall be provided on check valves which may be tapped for draining or used for by-pass. The inside and outside of all valves together with the working parts, except bronze and machined surfaces, shall be coated in accordance with AWWA C-550. Marking shall be in accordance with AWWA C-508 and shall include size, working pressure, and cast arrow to indicate direction of flow, name of manufacturer, and year of manufacture. Check valves shall be Style 159 as manufactured by M&H Valve Co., or equal.

2.3 FINISHES

A. Surface preparation shall be work of this Section and shall be performed in accordance with Section 09900.

B. Exterior of valves shall be primed and finish painted in accordance with Section 09900.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-or-round or local identification) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.2 INSTALLATION

A. General Applications - Refer to the drawings and piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install valves in horizontal piping with stem at or above the center of the pipe.

E. Install valves in a position to allow full stem movement.

F. Install swing check valves in a horizontal position with hinge pin level.

G. Valves and actuators shall be installed to be plumb in the vertical direction.

3.3 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.4 FIELD QUALITY CONTROL

A. After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.5 MANUFACTURER'S FIELD SERVICE

A. A manufacturer's field service representative shall be provided for a separate additional period of 8-hours on-site for each manufacturer to provide operator training in the calibration, use and maintenance of all equipment provided under this Section. The Contractor shall provide the Owner with a minimum 7 days written notice of planned operator training. Training shall be conducted separate from the specified start-up.

3.6 CLEANING

A. Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.7 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all equipment furnished under these Specifications will be withheld until after the installation and field testing by the Engineer. The manufacturer and the Contractor shall guarantee the equipment against defects of any kind for a period of one year after final testing and acceptance.

END OF SECTION

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SECTION 15120

PIPING SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Flexible Connectors

B. Related Sections

1. Section 15050 - Piping - General
2. Section 15110 - Valves

1.2 SUBMITTALS

A. Product data including body material, design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

PART 2 PRODUCTS

2.1 FLEXIBLE CONNECTORS

A. Manufacturers – Flexicraft, Unaflex, or General Rubber.

B. The flexible connectors shall be flanged spool-type rubber expansion joints of triple arch construction.

C. Expansion joints shall be constructed of a high strength fabric and elastomer, and reinforced with copper coated steel wire, or solid endless rings embedded in the carcass. The flanges shall be integral with the body of the joint and drilled to conform with standard 150 lb. drilling. The expansion joints shall be of the filled-arch construction, and the arch filler shall be a soft rubber which will be underneath the inner tube in order to provide a smooth interior. The exterior cover shall be Ethylene-Propylene Diene Monomer (EPDM) rubber for protection of the carcass from outside damage or abuse. The tube shall be EPDM for maximum abrasion resistance and shall be a single piece, seamless construction. All joints shall be finish coated with Hypalon paint.

D. Galvanized steel retaining rings shall also be provided for a metal backup ring behind the rubber flanges. The rings should be split to facilitate easy installation. Vibration isolated control units shall also be furnished to limit the motion of the expansion joints so as not to exceed the dimensions recommended by the manufacturer. Rubber expansion joints shall be standard Class 1 to 180°F and rated for 220 psi pressure and 27 in. Hg vacuum. They shall be Mercer Type 453 three arch coupling, or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Comply with Section 15050 and 15110 for examination of valves and piping specialties.

3.2 INSTALLATION

A. Comply with Section 15050 and 15110 for installation of valves and piping specialties.

3.3 FIELD QUALITY CONTROL

A. After piping systems have been tested and put into service, but before final adjusting and balancing, inspect connections for leaks. Adjust or replace as required to correct leaks.

3.4 CLEANING

A. Clean mill scale, grease, and protective coatings from exterior of piping specialties.

END OF SECTION

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SECTION 16050

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. Sub-Bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. The following should appear on the upper left-hand corner of the envelope:

Name of Sub-Bidder _____

ELECTRICAL

Sub-Bid for Sections: 13420, All Division 16

Project: Town of Westwood, Pump Station Maintenance & Improvements Project
Contract #DPW-16-C-018 - Town Bid #DPW-16-B-018

B. The Work to be done under these Sections is shown on the Drawings, Sheet Nos. #7, #8, #9, and #10

1.2 SUMMARY

A. Section Includes

1. Basic Electrical Requirements specifically applicable to Division 16 Sections
2. As-Built Documentation

B. Related Sections

1. Section 01770 - Closeout Procedures
2. Section 16080 - Electrical Testing

1.3 REFERENCES

A. ASCE 7-05 – Minimum Design Loads for Buildings and Other Structures

B. International Building Code – IBC 2009

C. Massachusetts Electric Code

D. Massachusetts State Building Code, 8th Edition, 780 CMR

E. NFPA 70 - National Electrical Code

F. NFPA 79 – Electrical Standard for Industrial Machinery

G. ANSI/ISA-S5.4 – Instrument Loop Diagrams

1.4 SUBMITTALS

A. Submit shop drawings, product data, and reports.

B. Submit as-built documentation in accordance with Section 01770. I&C documentation shall conform to the latest versions of NFPA 79 and ANSI/ISA-S5.4.

C. Submit a written warranty.

D. Seismic restraint details including stamped certification from a professional engineer.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable Massachusetts Building Code.

B. Electrical - Conform to Massachusetts Electrical Code. All references to the National Electrical Code or NEC in the project manual shall be construed as references to the Massachusetts Electrical Code.

C. Conform to applicable Local Building Codes.

D. Obtain and pay for all applicable permits.

E. Schedule and pay for all inspections necessary for the electrical installation including but not necessarily limited to the general electrical inspection and fire department inspections.

1.6 PROJECT CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission from the Engineer before proceeding.

C. Location of electrical equipment, devices, and similar items, as indicated, are approximate only. Exact locations are to be determined by the Contractor during construction. If any location is different from those indicated (greater than 5 feet away from location shown on Drawings), the Engineer must give approval to the change.

D. Verify in field, existing conditions and final locations of equipment installed under other Sections that require electrical work.

E. Equipment wiring

1. Equipment power and control wiring is based on specific manufacturers and models. Actual wiring required may be different.

2. Before pulling any power or control wire or installing conduit, obtain equipment electrical and control installation instructions and wiring diagrams. Any discrepancies from what is shown on the electrical drawings shall be brought to the attention of the Engineer. The Engineer will provide instructions for any changes that may be necessary.

3. Installation of conduit or wire prior to obtaining the above specified information shall be at the Contractor's risk. The Owner will not be

responsible for any extra costs related to removal or replacement of conduit or wire resulting from the failure to coordinate equipment conduit and wire requirements. In the event that additional conductors or larger conductors than shown on the Drawings are required, the Owner will not be responsible for any labor costs related to the installation of these materials unless it can be demonstrated by the Contractor to the satisfaction of the Engineer that these conductors could not have been installed at the same time as the conductors shown on the Drawings.

4. Provide wiring shown on the Drawings unless specifically excluded and except as follows:

F. Drawings and Specifications

1. Drawings and Specifications are typical of work done and of arrangement desired. Provide accessories and appurtenances necessary for complete installation (e.g., home runs, conduit and wire for instrumentation and control wiring) that are required to provide a complete electrical system.

G. As-Built Drawings: Maintain a master set of as-built drawings showing the changes and deviations from the Drawings or the approved shop drawings. Make markups as the changes are made.

H. Where underground electric facilities are installed, measure, record, and submit as built dimensions.

1.7 WARRANTY

A. Submit a written warranty, executed by the Contractor and manufacturer agreeing to the replacement and installation of all material, parts and adjustments required due to failure in materials or workmanship within one year from final acceptance of the Work.

B. This warranty shall be in addition to, and not a limitation of, other rights and remedies the Owner may have against any party under the Contract Documents. This warranty is in addition to all other warranties existing under either the Contract Documents or required by Law.

1.8 SEISMIC REQUIREMENTS

A. Components, systems and their supports shall be designed in accordance ASCE 7-05, Section 13.6 Mechanical and Electrical Components, the International Building Code (IBC 2009), and the Massachusetts Amendments to IBC 2009.

A. Submit details showing the seismic restraints.

B. Submit stamped, signed certification from a Massachusetts licensed professional structural engineer that the design meets the seismic restraint requirements.

1.9 WIRING METHODS

1. Minimum size conduit for power and control shall be ¾.

2. Only copper conductors shall be used. Absolutely no aluminum conductors will be allowed.

3. Standoff clamps with a minimum of ¼" space between the standoffs or unistrut with strut clamps shall be used.

4. All low voltage and Instrumentation cables (<50VDC) circuits can share the same conduit.

5. Do not mount boxes or cabinets directly against the wall, spacers must be used

6. The use of Reducing Washers, Ericsons, Set Screw fittings, or Running Thread nipples WILL NOT be allowed. Meyers hubs shall be used on all conduits entering boxes, unless the box has a hub.

PART 2 PRODUCTS

2.1 GENERAL

A. Products shall be Underwriter's Laboratory (UL) listed if a UL listing for that product is available.

2.2 FINAL SYSTEM DOCUMENTATION

A. Prior to final acceptance of the system, provide operating and maintenance manuals (O&M's) covering instruction and maintenance on each type of equipment in accordance with Section 01770.

B. The requirements for final documentation shall be as specified in Section 01770.

PART 3 EXECUTION

3.1 INSTALLATION

A. Perform all work in accordance with OSHA (Occupational Safety and Health Administration) requirements.

B. Perform all work in accordance with NFPA 70E, Handbook for Electrical Safety in the Workplace.

C. Install all equipment in accordance with manufacturer's instructions and recommendations.

D. Test all electrical components in accordance with Section 16080 and as indicated in individual electrical equipment specification sections.

E. Perform all electrical equipment installation, checkout, and test in a safe manner. Provide the following special safety precautions, as appropriate:

1. Locking and tagging procedures

2. Barricades

3. De-energization and/or isolation of equipment prior to testing

4. Review of procedures with the Engineer and the Owner

5. Erection of warning signs

6. Stationing of guards and watchmen

7. Maintenance of voice communications

8. Personnel orientation

F. Before energizing any machine, visually inspect for serviceability. Verify that equipment and machines have been properly lubricated and aligned. Verify nameplate for electrical power requirements.

END OF SECTION

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SECTION 16060

GROUNDING AND BONDING

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid-Electrical.

1.2 SUMMARY

A. Section Includes

1. Electrical equipment and raceway grounding and bonding
2. Communication system grounding

B. Related Sections

1. Section 16080 – Electrical Testing

1.3 REFERENCES

A. NFPA 70 – National Electrical Code

1.4 SYSTEM DESCRIPTION

A. Provide communications systems grounding conductor at point of service entrance and connect to nearest effectively grounded building structural steel member or, if such is not available, to the nearest grounding electrode other than a water pipe.

B. Bond together exposed non-current carrying metal parts of electrical equipment, handrails, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, metallic tanks and all metallic piping.

C. Install grounding in accordance with NEC Article 250.

1.5 SUBMITTALS

A. Submit shop drawings, product data, and reports.

B. Indicate layout of ground rods, location of system grounding electrode connections, and routing of grounding electrode conductor.

C. Submit ground resistance testing reports in accordance with Section 16080.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grounding Conductors - insulated copper, minimum size #12 AWG and in accordance with NEC Tables 250.66 or 250.122, or larger if so indicated on the Drawings

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide a separate, insulated equipment grounding conductor with each feeder and branch circuit. Terminate each end on a grounding lug, bus, or bushing.

B. Use grounding bushings on all conduits stubbed up below equipment, panelboards, switchboards and motor control centers. Bond all conduits to ground bus. Use grounding bushings to ground electrical equipment and exposed non-current carrying metal parts.

C. Use minimum #6 AWG copper conductor for communications service grounding conductor. Leave 10' slack conductor at terminal board.

3.2 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation and compliance with NEC Article 250.

3.3 TESTING

A. Perform ground tests using a low resistance, Null balance type, ground testing ohmmeter, with test lead resistance compensated for. Use the type of test instrument which compensates for potential and current rod resistances.

B. Ground resistance of conduits, equipment cases, and supporting frames, shall not vary from that of system as a whole and shall not exceed 25 ohms to ground. Measure resistance to ground of representative items, as directed by the Engineer. Submit all readings to the Engineer.

END OF SECTION

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SECTION 16070

ELECTRICAL HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical.

1.2 SUMMARY

A. Section Includes

1. Support channel
2. Fastening hardware
3. Anchor bolts

1.3 REFERENCES

A. ASTM A-780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dipped Galvanized Coatings

1.4 SUBMITTALS

A. Submit shop drawings, product data, and reports.

1.5 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 PRODUCTS

2.1 SUPPORT CHANNEL

A. Support channel shall be fiberglass in chemical feed and storage areas. Support channel shall be galvanized steel elsewhere unless noted otherwise.

B. Support channel assembly hardware shall be stainless steel.

C. Support channel shall be by Unistrut, Wayne, MI; B-Line, Highland, IL; Thomas&Betts, Memphis, TN; or equal.

2.2 FASTENING HARDWARE

A. All fastening hardware shall be 304-stainless steel unless noted otherwise.

2.3 ANCHOR BOLTS

A. Anchor bolts, nuts, washers, bolt sleeves, and assembly hardware shall be Type 316 stainless steel. Expansion bolts shall be “Kwik Bolt II” or “HVA Adhesive Anchor” by Hilti, Tulsa, OK; Redhead “Trubolt Wedge” or “Epcon Adhesive Anchor” by ITW Ramset / Red Head, Wood Dale, IL; or Parabolt as manufactured by the Molly Division Emhart Corp., or equal.

B. All expansion/adhesive bolts and associated hardware are to be stainless steel.

2.4 PIPE CLAMPS AND STANDOFFS

A. Pipe clamps and standoffs shall be one hole, malleable iron type. They shall be of the same manufacturer and shall be designed to be used together.

B. The finish shall be suitable for the piping system being supported. If PVC or PVC coated conduit is being supported, PVC coated clamps and standoffs shall be used.

2.5 THREADED RODS

A. Threaded hanging rods shall be 304 stainless steel and be one piece. The size shall be suitable for the loads being supported.

PART 3 EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts or beam clamps. Do not use spring steel clips and clamps.

B. Use expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use powder-actuated anchors.

E. Fabricate supports from hot-dipped galvanized structural steel or hot-dipped galvanized steel channel rigidly welded or bolted to present a neat appearance. Use stainless steel hexagon head bolts with spring lock washers under all nuts. Coat ends of galvanized steel channel that has been cut with zinc-rich paint in accordance with ASTM A-780.

F. Install freestanding electrical equipment on 4 inch concrete housekeeping pads.

G. Install surface-mounted cabinets and panelboards with minimum of four 316 stainless steel anchors. Provide galvanized steel channel supports to stand cabinet 1 inch off wall.

H. Bridge studs top and bottom with galvanized steel channels to support flush-mounted cabinets and panelboards in stud walls.

I. Use standoffs on surface mounted conduit to maintain ¼ inch space between conduits and walls.

END OF SECTION

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SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical.

1.2 SUMMARY

A. Section Includes

1. Nameplates
2. Wire and cable markers

1.3 REFERENCES

A. NEMA WC5 - Thermoplastics - Insulated Wire and Cable for Transmission and Distribution of Electrical Energy

B. ANSI C57

1.4 SUBMITTALS

A. Provide schedule for nameplates.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Engraved three-layer plastic, white letters on a black background

2.2 WIRE AND CABLE MARKERS

A. Wires up to AWG10: Split sleeve or tubing type waterproof markers (Thomas & Betts, Panduit, Burndy, Sur-Code Sleeve Markers or equal).

B. Wires AWG8 and larger: Plastic impregnated cloth markers, resistant to abrasion, moisture, dirt and oil (Ideal, Panduit, Brady or equal).

PART 3 EXECUTION

3.1 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Wording of the nameplates shall be in conformance with Drawings and acceptable to the Owner. Secure nameplates to equipment fronts using ASA Type U drive screws, and water resistant adhesive. Secure nameplate to face of panelboard doors one third of the way down from the top of the door.

D. Embossed tape will not be permitted for any application.

3.2 WIRE IDENTIFICATION

A. Provide wire markers on each end of each conductor in panelboard gutters, pull boxes, outlet and junction boxes, switchgear, switchboards, motor control centers, control panels, at each load connection and at each terminal board connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

B. Circuits passing through junction boxes shall be individually grouped and bound with Ty-raps.

C. Include the following color coding of all conductors used for power or lighting circuits.

1. 120/240 volt, single phase 3 wire

   a. Black - Phase A

   b. Red - Phase B

   c. White - Neutral

   d. Green - Equipment ground

2. 120/208 volt, three phase 4 wire

   a. Black - Phase A

   b. Red - Phase B

   c. Blue - Phase C

   d. White - Neutral

   e. Green - Equipment ground

3. 277/480 volt 3 phase 4 wire

   a. Brown - Phase A

   b. Orange - Phase B

   c. Yellow - Phase C

   d. Gray - Neutral

   e. Green - Equipment ground

D. Color coding of multiconductor control cables shall be in accordance with NEMA Standard WC5.

E. Wire identification shall comply as follows:

1. Branch circuit equipment grounding conductors smaller than #8 shall have a green jacket, **green tape is not acceptable.** (i.e. #8 THHN)

2. Wire numbers shall be supplied and installed at each terminated end of every conductor.

3. 480-volt motor leads shall be identified with Brown (T1), Orange (T2), and Yellow (T3) markings. 240-volt and 208-volt motor leads shall be identified with Black (T1), Red (T2), and Blue (T3) markings. In the event that incorrect motor rotation requires reversal of two-phase conductors, that wiring change shall be made at the motor feeder circuit breaker.

   Conductors carrying more than 10 Amperes shall be of suitable size for the application, and comply with all local and national electrical codes.

   Conductors carrying AC current used for field controls shall be a type THHN or TFFN insulation, stranded #16 gauge wire.

4. All control and instrumentation conductors shall be one continuous length without splices.

3.3 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates of minimum letter height as scheduled below.

B. Panelboards, Switchboards, and Motor Control Centers - ¼ inch to identify equipment designation, 1/8 inch to identify voltage rating and source.

C. Switches in Panelboards, Switchboards, and Motor Control Centers - ¼ inch to identify circuit and load served, including location.

D. Motor Starters in Motor Control Centers and Control Panels - ¼ inch to identify circuit and load served, including location.

E. Individual Circuit Breakers, Enclosed Switches, Remote Operator Stations, Time Clocks, Control Devices, and Motor Starters – 1/8 inch to identify load served.

F. Transformers - ¼ inch to identify equipment designation, 1/8 inch to identify primary and secondary voltages, primary source, and secondary load and location. Power transformer nameplates shall be in accordance with ANSI C57.

G. Pumps, fans, and other electrical equipment - ¼ inch to identify equipment designation.

H. Equipment With More Than One Power Source, Including Motors With Heaters - ¼ inch to identify power sources. Mount nameplate on motor disconnect switch, equipment enclosure, or other prominent location.

END OF SECTION

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SECTION 16080

ELECTRICAL TESTING

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical

1.2 SUMMARY

A. Section Includes

1. Testing of Electrical Systems - General
2. Electrical Test Equipment
3. Electrical Test Procedures
4. Specific Electrical Tests

B. Related Sections

1. Section 16060 – Grounding and Bonding
2. Section 16075 – Electrical Identification

1.3 REFERENCES

A. Massachusetts Electric Code

B. NFPA 79 – Electrical Standard for Industrial Machinery

C. ANSI/ISA-S5.4 – Instrument Loop Diagrams

D. ANSI C37

1.4 SUBMITTALS

A. General: Testing shall be performed, with satisfactory results, prior to connecting and energizing equipment. Problems discovered as a result of testing shall be corrected and retesting performed prior to connecting and energizing equipment.

B. The following test reports shall be submitted

1. Motor test results
2. Wire and cable continuity test results

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 TESTING OF ELECTRICAL SYSTEMS - GENERAL

A. Provide supervision, labor, materials, tools, test instruments and other equipment or services and expenses required to test, adjust, set, calibrate, and operationally check work and components of the various electrical and control systems and circuitry throughout the contract.

B. Pay for all tests specified in Division 16, including expenses incident to re-tests occasioned by defects and failures of equipment to meet specifications. Unless otherwise specified, the Owner will supply the electric current necessary for tests.

C. After completion of testing replace wiring and equipment found defective (defined as failing to meet specified requirements).

D. Do not void equipment warranties or guarantees by testing and checkout work. Checks and tests shall be supplemental to and compatible with the manufacturer's installation instructions. Where deviations are apparent, obtain the manufacturer's approved review of procedure prior to testing. Where any repairs, modifications, adjustments, tests or checks are to be made, contact the Engineer to determine if the work should be performed by or with the manufacturer's representative. All checks and tests specified for proper operating and safety of equipment and personnel are to be performed concurrent with progression of the work, prior to final acceptance by the Owner.

E. At any stage of construction and when observed, any electrical equipment or system determined to be damaged, or faulty, is to be reported to the Engineer. Corrective action requires Engineer’s approval prior to re-testing, and inspection.

F. Prior to testing and start-up, equipment and wiring shall be properly and permanently identified with nameplates, and other identification as specified in Section 16075. Check and tighten terminals and connection points, remove shipping blocks and thoroughly clean equipment, repair damaged or scratched finishes, inspect for broken and missing parts and review and collect manufacturer's drawings and instructions for delivery to the Engineer. Make routine checks and tests as the job progresses to ensure that wiring and equipment is properly installed.

G. Testing and checkout work is to be performed with fully qualified personnel skilled in the particular tests being conducted. Personnel are to have at least 5 years of experience with tests of same type and size as specified.

H. Conduct tests in presence of the Engineer. Notification is required 7 calendar days or more in advance when any test is to be performed, and do not start tests without approval.

I. Make openings in circuits for test instruments and place and connect instruments, equipment, and devices, required for the tests. Upon completion of tests, remove instruments and instrument connections and restore circuits to permanent conditions.

J. Identify test being performed, conductor or equipment the test is being performed on, date the test was performed, value of test results, person performing the test, the witness to the test, and the serial and model number and description of test

instrument. Arrange information in tabular form and submit to the Engineer for approval.

K. When the electrical tests and inspections specified or required within Division 16 are complete and results reported, reviewed, and approved, that portion of the electrical equipment system or installation may be considered electrically complete. Affix appropriate, approved, and dated completion or calibration labels to the tested equipment and notify the Engineer of electrical completion. If the Engineer finds completed work unacceptable, he will notify the Contractor in writing of unfinished or deficient work, with the reason for his rejection, to be corrected by the Contractor. The Contractor will notify the Engineer in writing when exceptions have been corrected. The Contractor will prepare a "notification of Substantial Electrical Completion" for approval by the Engineer following the Engineer's acceptance of electrical completion. If later in-service operation or further testing identifies problems attributable to the Contractor, these will be corrected.

3.2 ELECTRICAL TEST EQUIPMENT

A. Test equipment used is to be inspected and calibrated.

B. Perform calibration and setting checks with calibrated test instruments of at least twice that of the accuracy of the equipment, device, relay or meter under test. Dated calibration labels shall be visible on test equipment. Calibrations over 6 months old are not acceptable on field test instruments. Inspect test instruments for proper operation prior to proceeding with the tests.

C. Perform ground tests using a low resistance, Null balance type, ground testing ohmmeter, with test lead resistance compensated for. Use the type of test instrument which compensates for potential and current rod resistances.

3.3 TEST PROCEDURES

A. Prepare procedures and schedules for the work specified herein. This work is to be coordinated and compatible with both the work and schedule of the other crafts. Sequence the tests and checks so that the equipment can be energized immediately after the completion of the application tests.

B. The test procedures shall provide specific instructions for the checking and testing of each electrical component of each system. Schedule tests and inspections as the job progresses.

C. Testing and checkout work shall be conducted in a safe manner. Provide the following special safety precautions, as appropriate:

1. Locking and tagging procedures

2. Barricades

3. Deenergization and/or isolation of equipment prior to testing

4. Review of procedures with the Engineer and Resident Project Representative

5. Erection of warning signs

6. Stationing of guards and watchmen

7. Maintenance of voice communications

8. Personnel orientation

D. Before energizing any machine, visually inspect for serviceability. Check manufacturer's instruction manual for correct lubrication and ventilation. Align motor with driven equipment. Check nameplate for electrical power requirements.

3.4 SPECIFIC ELECTRICAL TESTS

A. Motors

1. Perform insulation tests on motor windings and record results.

2. Test run motors 1 HP and above uncoupled or unloaded, before placing into operation. Check the motor for rotation, speed, current and temperature rise under normal load and record the results.

B. Wire and Cable

1. Continuity test each control and/or low voltage (below 480 volts) wire and cable to verify the field applied tag per conductor and record results.

C. Relay Panels, Operator and Instrument Control Panels, Programmable Controllers, Micro-Processors, Battery Systems and Other Miscellaneous Equipment

1. Upon completion of equipment installation, visually and functionally test equipment and their control devices for tightness of connections and for proper operation. In the case of battery systems, static inverters and similar equipment, follow manufacturer's recommended test and installation manuals upon review and approval by the Engineer. In the case of operator, instrument, and relay panels and cabinets or devices used solely for control, functionally test each circuit for proper operation and compliance with the Drawings and Specifications. Where functional testing is deemed undesirable by the Engineer from a safety or plant operational standpoint, then continuity and terminal connection verification checks will be acceptable.

D. Grounding Systems

1. Test in accordance with Section 16060.

END OF SECTION

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SECTION 16091

MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid Electrical.

1.2 SUMMARY

A. Section Includes

1. Electrical demolition

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: as specified in individual Sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on field observation and existing record documents. Report discrepancies to the Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

C. Existing Electrical Service: Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

D. Existing Fire Alarm System: Disable system only to make switchovers and connections. Notify Owner and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangements.

3.5 INSTALLATION

A. Install relocated materials and equipment as indicated.

END OF SECTION

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SECTION 16120

CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical.

1.2 SUMMARY

A. Section Includes

1. Building wire and cable
2. Shielded signal cable
3. Wire connectors

B. Related Sections

1. Section 16075 - Electrical Identification

1.3 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code

1.4 SUBMITTALS

A. Submit shop drawings, product data and reports.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.6 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions. Determine required separation between cable and other work.

C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Description: Stranded conductor insulated wire, multi-conductor control cable and tray cable.

B. Conductor: copper

C. Insulation Voltage Rating: 600 volts

D. Insulation: ANSI/NFPA 70; Type THW, 75°C insulation, XHHW, THHW insulation for underground power wiring AWG 8 and larger; type THHN/THWN insulation for aboveground feeders and branch circuits, and underground power wiring AWG 10 and smaller. Type SF-2, 200°C insulation, silicone fixture wire for fixture taps, Type MTW insulation for wiring within motor control centers. Type THHN/THWN insulation for AWG 14 control wire.

E. Manufacturer

1. Okonite Co.
2. Rome Cable Corp.
3. American Insulated Wire Corp.
4. Southwire
5. or equal

2.2 SHIELDED SIGNAL CABLE

A. Description: twisted pair shielded instrumentation wire, NEC type TC listed, wet location, approved for Class 1 circuits as permitted in NEC Article 725.

B. Conductor: tinned copper 18 AWG

C. Insulation Material: PVC with a nylon overcoat

D. Insulation Temperature Rating: 75°C wet, 90°C dry

E. Shield: 100% coverage, with drain wire

F. Jacket: 90°C PVC

G. Insulation voltage rating: 600 volts

H. Manufacturer

1. Belden No. 9341
2. Approved equal by Alpha
3. Approved equal by Clifford
4. or equal

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Minimum size for power wiring shall be AWG #12.

B. Minimum size for control wiring shall be AWG #14.

C. All wiring shall be run in conduit, unless otherwise noted.

D. Install products in accordance with manufacturers instructions.

E. Use stranded conductors for all wire sizes.

F. In raceways, mechanically complete the installation in all details. Pull all conductors into raceway at same time.

G. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

H. Protect exposed cable from damage.

I. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.

J. Use suitable cable fittings and connectors.

K. Neatly train and lace wiring inside boxes, equipment, and panelboards.

L. Clean conductor surfaces before installing lugs and connectors.

M. Instrumentation, control and signal wiring shall be continuous with no splices from source to destination, unless otherwise shown on drawings.

N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

O. Use split bolt connectors for copper conductor splices and taps, 8 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

Q. Ground signal cable shields on receiving end only.

R. Properly connect and insulate shields at all splice points.

S. Provide Kellems grips for all cord connected devices.

T. Provide separation of power wiring from control and signal wire in accordance with NEC Article 725.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of Section 16075.

B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.5 FIELD QUALITY CONTROL

A. Inspect wire and cable for physical damage and proper connection.

B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

C. Verify continuity of each branch circuit conductor.

END OF SECTION

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SECTION 16131

CONDUIT

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This section is part of filed Sub-Bid – Electrical.

1.2 SUMMARY

A. Section Includes

1. Metal conduit
2. Non-metallic (PVC) conduit
3. Fittings and conduit bodies
4. Conduit wall seals, existing walls
5. Fire stop fittings
6. Underground warning tape
7. Conduit expansion joint
8. Conduit sealing bushing
9. Explosion proof sealing fittings

B. Related Sections

1. Section 16060, Grounding and Bonding
2. Section 16070, Electrical Hangers and Supports

1.3 REFERENCES

A. ACI 318 – Building Code Requirements for Structural Concrete

B. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

C. ANSI/NFPA 70 - National Electric Code

D. NEMA TC 2 - Electrical Plastic Tubing (EPT)

E. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit

F. ANSI C80.1 - Galvanized Rigid Steel Conduit, Zinc Coated

G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

H. UL-6 – Standard for Rigid Metal Conduit

I. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated

J. ANSI C80.6 – Intermediate Metal Conduit, Zinc Coated

1.4 SUBMITTALS

A. Shop drawings, product data and reports

B. Riser Diagrams for the electrical installation

1.5 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.7 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

D. Provide complete conduit systems between electrical equipment and devices as required.

PART 2 PRODUCTS

2.1 GENERAL CONDUIT REQUIREMENTS

A. Minimum Size: 3/4 inch unless otherwise specified

B. In or under slab on grade: Use galvanized rigid steel conduit

C. Outdoor Exposed locations: Use rigid steel conduit

D. Underground locations: Use concrete encased PVC schedule 40 conduit

E. Class 1 Division 1 and 2 Hazardous Locations

1. Use galvanized rigid steel conduit

2. Provide sealing fittings at each entrance to enclosure housing an arcing device. Locate seal fittings as close as possible, in no case more than 18 inches.

3. Provide seal fittings for each conduit leaving hazardous (Class 1 Division 1 or 2) area.

4. Use conduit seal fittings appropriate for conduit orientation.

5. Use conduit sealing compound with fiber dam in compliance with manufacturer's recommendations.

6. Provide junction boxes rated for hazardous locations.

F. All Other Locations:

1. Concealed: Use galvanized rigid steel conduit

2. Exposed: Use galvanized rigid steel conduit

G. Connections to portable equipment from junction boxes and connections to all motors: use liquid tight flexible metal conduit.

1. Minimum Length: 12 inches

2. Maximum Length: 36 inches

2.2 RIGID STEEL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket

B. Fittings: ANSI/NEMA FB 1

2.4 NONMETALLIC (PVC) CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC

B. Fittings: NEMA TC3

2.5 CONDUIT WALL SEALS, EXISTING WALLS

A. Type - Suitable for core drilled holes

B. Manufacturer

1. O-Z Gedney, Type CSM

2. Or equal

2.6 FIRE STOP FITTINGS

A. Type - Fittings with elastomeric rings to seal smoke and fumes

B. Fire rating of seal to be equal to or greater than rating of wall

C. Manufacturers

1. O-Z Gedney, Type CFS

2. Or equal

2.7 UNDERGROUND WARNING TAPE, DETECTABLE

A. Warning tape for all buried electrical conduit shall be solid aluminum foil core tape and printed with the words “CAUTION - BURIED ELECTRICAL LINE BELOW.”

B. Tape shall be red and 6 inches wide.

C. Manufacturers

1. Ideal

2. or equal

2.8 FITTINGS AND CONDUIT BODIES

A. Fittings

1. Description - Threaded, malleable Iron. Coating to correspond with type of conduit system being used

B. Conduit Bodies

1. Manufacturer

a. Appleton-Type Mogul - malleable iron

b. Equal by O-Z Gedney

c. Equal by Crouse-Hinds

d. or equal

C. Conduit Hubs

1. Manufacturer

a. Crouse Hinds – Myers hub Type HUB

1) Zinc in damp and wet locations

2) Stainless steel in wet and corrosive locations

b. Equal by O-Z Gedney

c. Equal by RACO

d. Equal by Appleton

e. or equal

2.9 CONDUIT EXPANSION JOINT, RIGID STEEL CONDUIT

A. Weather tight, internal ground, expansion joint for galvanized rigid steel conduit, 4 inch maximum conduit movement

B. Manufacturer

1. Crouse-Hinds Type XJG

2. Appleton Type XJ

3. O-Z Gedney Type AX

4. or equal

2.10 CONDUIT EXPANSION FITTING, PVC

A. Expansion fitting for PVC conduit shall compensate for length changes due to temperature variations in exposed conduit runs, 4-inch maximum conduit movement.

B. Manufacturer

1. Carlon

2. or equal

2.11 CONDUIT SEALING BUSHING

A. Description: Bushing that provides a waterproof seal around wire and cables in a conduit

B. Construction: Slotted PVC coated steel discs, neoprene sealing ring and stainless steel head cap screws and washers

C. Manufacturer

1. O-Z Gedney Type CSBI

2.12 EXPLOSION PROOF SEALING FITTINGS

A. Description: Explosion proof and dust-ignition proof sealing fitting

B. Ratings:

1. Class I, Division 1 and 2, Groups A, B, C, D

2. Class II, Division 1, Groups E, F, G

3. Class II, Division 2, Groups F, G

4. Class III

C. Bodies: Feraloy iron alloy and/or ductile iron

D. Plugs: Feraloy iron alloy and/or steel

E. Removable Nipples: steel

F. Manufacturer:

1. Crouse-Hinds type EYS

2. Approved equivalent

G. Sealant:

1. Crouse-Hinds Chico X fiber and Chico A sealing compound or Chico Speed Seal

2. Sealant system of sealing fitting manufacturer selected

PART 3 EXECUTION

3.1 INSTALLATION

A. Junction boxes shown on the Drawings shall be provided in locations indicated. Additional boxes shall be provided as needed to comply with NFPA 70 requirements.

B. Install conduit in accordance with NECA "Standards of Installation."

C. Install nonmetallic conduit in accordance with manufacturer's instructions.

D. Arrange supports to prevent misalignment during wiring installation.

E. Support conduit using coated steel or malleable iron straps, pipe hangers, U-bolt clamps and beam clamps.

F. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

G. Fasten conduit supports to building structure and surfaces under provisions of Section 16070.

H. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

I. Do not attach conduit to ceiling support wires.

J. Arrange conduit to maintain headroom and present neat appearance.

K. Route exposed conduit parallel and perpendicular to walls.

L. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

M. Route conduit in and under slab from point-to-point unless drawings indicate otherwise.

N. Cross conduits in slab only with the Engineer’s approval.

O. Maintain adequate clearance between conduit and piping.

P. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104°F.

Q. Cut conduit square using saw or pipe cutter; de-burr cut ends.

R. Before installation of wires and cables, clean and dry inside of each conduit run.

S. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fittings. Allow joint to cure for 20 minutes, minimum.

T. Use conduit hubs to fasten conduit to boxes and control panels in damp and wet locations. For wet and corrosive locations, use stainless steel conduit hubs.

U. Install no more than equivalent of three 90° bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.

V. Support conduits within 6 inches of each side of a bend or elbow.

W. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

X. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

Y. Provide 100-lb. test nylon pull string in each conduit 2 inch or larger except sleeves and nipples.

Z. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

AA. Ground and bond conduit in accordance with Section 16060.

BB. Do not penetrate waterproofing membranes in the structural floor slab or foundation walls without approval by, and in a manner acceptable to the Engineer.

CC. Install rigid steel conduit using only threaded fittings.

DD. Use two locknuts, one inside and one outside of each box and enclosure when enclosure ratings are NEMA 1 or 12.

EE. Install a chromium plated, spun or split type escutcheon on all exposed conduits passing through walls or ceilings.

FF. Extend pipe sleeves 3/4 inch above finished floors.

GG. Install a water and fire resistant caulking around all conduits passing through floors.

HH. Provide separate conduit runs for 480 and 120/208 volts systems. Install motor feed and control wiring in the same conduit only when shown on the Drawings or as approved by the Engineer.

II. Install all empty conduits in floor so finished installation is flush with finished floor. Use suitable coupling and pipe plug.

JJ. Arrange for all duct bank systems to drain away from buildings. Install duct bank systems to drain toward manholes or handholes.

KK. Provide thru wall seals on all conduits passing through foundation walls.

LL. Provide a 4 inch band of black asphaltic paint, 2 inches in the concrete and 2 inches above floor, at all galvanized rigid steel conduit floor penetrations in pump chambers, tunnels, cellars and other below grade high moisture areas.

MM. Provide a 4 inch band of black asphaltic paint, 2 inches in the concrete and 2 inches in the soil, at all galvanized rigid steel penetrations through floors or walls into soil.

NN. Use PVC coated hangers and straps to support PVC conduit.

OO. Use PVC conduit fittings and bodies with PVC conduit.

PP. Install underground warning tape 12 inches above all underground conduits.

QQ. Install underground conduit with minimum cover, in accordance with National Electric Code or utility requirements, but no less than 36 inches.

RR. For non-concrete encased underground conduit installations, backfill the trench with sand borrow for the full width of the trench and extend the sand borrow 12-inches over the conduit.

SS. For penetrations in existing walls, patch with mortar and touch up paint. Match existing paint color.

TT. For penetrations in fire rated walls, use materials that maintain the fire rating of the wall.

UU. For penetrations in new concrete walls, provide conduit nipple cast into the concrete.

VV. Provide conduit expansion joints for underground conduits that enter a building through an exterior wall or connect to an exterior mounted disconnect switch, meter, or other equipment.

WW. Provide explosion proof sealing fittings where indicated on the Drawings and where required by code.

XX. Size and spacing of conduits embedded in concrete slabs or walls shall be per ACI 318, including the following:

1. Conduits embedded in concrete slabs or walls shall not be larger in outside diameter than one-third of the overall thickness of the slab or wall in which they are embedded.

2. Conduits embedded in concrete slabs or walls shall not be spaced closer than three conduit diameters on center.

END OF SECTION

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SECTION 16136

BOXES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical

1.2 SUMMARY

A. Section Includes

1. Conduit Hubs
2. Wall and ceiling outlet/device boxes
3. Pull and junction boxes
4. Covers

1.3 REFERENCES

A. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes and Conduit Bodies for Conduit and Cable Assemblies

B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports

C. ANSI/NFPA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

D. NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum)

1.4 SUBMITTALS

A. Shop drawings, product data, and reports

1.5 PROJECT CONDITIONS

A. Verify that the field measurements are as shown on the Drawings.

B. Verify locations of outlets in offices and work areas prior to rough-in.

C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 5 feet of location shown.

1.6 DESIGN REQUIREMENTS

A. Unless otherwise specified or indicated on Drawings, NEMA rating for boxes shall correspond as follows to location classifications indicated on Drawings. Locations for which a classification is not indicated are to be considered dry locations unless otherwise designated by Code.

1. Dry locations - NEMA 1 Metallic Boxes
2. Damp locations and Wet locations - NEMA 4 Metallic Boxes

3. Corrosive locations - NEMA 4X Metallic and Non-Metallic Boxes

4. Wet & Corrosive locations - NEMA 4X Metallic and Non-Metallic Boxes

5. Class 1 Division 1 or 2 Group D - NEMA 7, sealed, gasketed Boxes

PART 2 PRODUCTS

2.1 WALL AND CEILING OUTLET/DEVICE BOXES

A. Sheet Metal Outlet/Device Boxes

1. NEMA OS 1, galvanized steel.

2. Provide green grounding screw.

3. Acceptable Manufacturers

a. Appleton.

b. Raco.

c. Steel City.

d. or approved equal.

B. Cast Metal Outlet/Device Boxes

1. NEMA FB 1, Type FD, cast iron with internal green grounding screw terminal.

2. Shall be suitable for use in wet locations when used with gasketed covers.

3. Cover shall be by box manufacturer, and shall have stainless steel cover screws and a neoprene gasket.

4. Surface-mounted cast boxes shall have mounting lugs, do not drill though the box walls.

5. Coating shall match that of the conduit system being used.

6. Provide threaded sealing conduit hubs on all conduit entries.

7. Acceptable Manufacturers

a. Crouse-Hinds.

b. Appleton.

c. Hubbell.

d. or approved equal.

C. Non-metallic Outlet/Device Boxes

1. NEMA OS 2.

2. Material shall be suitable for the chemicals in the area.

3. Cover shall be by box manufacturer, and shall have stainless steel cover screws and gasket.

4. Screws shall be stainless steel.
5. Acceptable Manufacturers
   a. Raco.
   b. Carlon.
   c. Thomas & Betts.
   d. or approved equal.

2.2 PULL AND JUNCTION BOXES

A. Sheet Metal Pull and Junction Boxes
   1. NEMA OS 1, Galvanized or Painted Steel.
   2. Provide green grounding screw.
   3. Acceptable Manufacturers
      a. Raco.
      b. Appleton.
      c. Steel City.
      d. or approved equal.

B. NEMA 4X Stainless Steel Pull and Junction Boxes
   1. NEMA OS 1, Type 4X Stainless Steel (16 gauge minimum). Screws shall be stainless steel.
   2. Provide green grounding screw.
   3. Acceptable Manufacturers
      a. Hoffman.
      b. McKinstry.
      c. Wiegmamn.
      d. or approved equal.

C. Cast Metal Pull and Junction boxes
   1. NEMA FB 1, type 4 cast iron
   2. Shall be suitable for use in wet locations when used with gasketed covers.
   3. Cover shall be by box manufacturer, and shall have stainless steel cover screws and a neoprene gasket.
   4. Coating shall match that of the conduit system being used.
   5. Surface-mounted cast boxes shall have mounting lugs, do not drill though the box walls.

6. Provide threaded sealing conduit hubs on all conduit entries.

7. Provide green grounding screw.

8. Acceptable Manufacturers

   a. Crouse-Hinds.

   b. Appleton.

   c. Hubbell.

   d. or approved equal.

D. Non-Metallic Pull and Junction Boxes

1. NEMA OS 2, NEMA 4X

2. If located outdoors, the material shall be ultraviolet stabilized for outdoor use.

3. If located in a chemical area, the material shall be suitable for the chemicals in that area.

4. Screws shall be stainless steel.

5. Acceptable Manufacturers

   a. Raco.

   b. Carlon.

   c. Robroy/Stahlin.

   d. or approved equal.

E. Boxes exceeding 48 inches in any direction shall be provided with angle iron stiffeners.

2.3 NEMA 7 EXPLOSION-PROOF BOXES

A. Boxes shall be rated for the hazardous classification of the area, Class I, Division 1, Division 2, etc.

2.4 COVERS

A. Provide covers for all boxes. Covers shall be screw fastened or hinged and comply with NEMA Standards OS 1, OS 2 or FB 1.

2.5 CONDUIT HUBS

A. Conduit hubs shall be threaded and sealing type with neoprene gasket.

B. Acceptable Manufacturers

1. Crouse Hinds - type "HUB".

2. Thomas & Betts - type "BULLET".

3. Equal by Appleton.

4. or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

D. Use flush mounting outlet boxes in finished areas.

E. Secure flush mounting box to interior wall without damaging wall insulation or reducing its effectiveness. Accurately position to allow for surface finish thickness.

F. Do not fasten boxes to ceiling support wires.

G. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

H. Use gang box where more than one device is mounted together. Do not use sectional box.

I. Sheet Metal Outlet/Device Boxes

1. Use only in areas rated as Dry Locations.

J. Cast Metal Outlet/Device Boxes

1. Use in locations exposed to the weather, wet locations, surface mounted and pendant mounted locations and all locations where non-PVC coated rigid conduit is used. Use sealing conduit hubs on all conduit entries.

K. Pull and Junction Boxes

1. Use sealing conduit hubs on all conduit entries.

2. Use stainless steel pull and junction boxes where PVC coated conduit is required and in locations rated as Wet and Corrosive, except where stainless steel is inadequate for corrosiveness of area. Use Non-Metallic in that case.

3. Use Cast Metal pull and junction boxes in all locations where non-PVC coated rigid conduit is used and in locations rated as Wet Location.

3.2 ADJUSTING

A. Install knockout closure in unused box opening.

END OF SECTION

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SECTION 16137

CONTROL CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical

1.2 SUMMARY

A. Section Includes

1. Cabinets and Construction
2. Control Devices

B. Related Sections

1. Section 16070 – Electrical Hangers and Supports
2. Section 16490 – Components and Accessories

1.3 REFERENCES

A. NEMA 250 - Enclosures for Electrical Equipment (1,000 volts Maximum)

B. ANSI/NEMA ICS 1 – General Standards for Industrial Control and Systems

C. ANSI/NEMA ICS 6 - Enclosures for Industrial Control Equipment and Systems

D. NFPA 70 – Article 409, Industrial Control Panels

E. NFPA 79 – Electrical Standard for Industrial Machinery

F. UL 508 – Safety Standard for Industrial Control Equipment

1.4 SUBMITTALS

A. Shop drawings, product data, and reports

B. Shop Drawings for Equipment Panels: Include wiring schematic diagram (with wire numbers for all wires), outline drawing, construction diagram and dimensions as described in ANSI/NEMA ICS 1 and NFPA 79

PART 2 PRODUCTS

2.1 CABINETS

A. Construction: NEMA 250

B. Cabinet materials and ratings shall be as follows (unless otherwise indicated on the drawings):

1. Dry Locations: NEMA 12 metallic
2. Damp locations and wet locations: NEMA 4 metallic
3. Corrosive locations: NEMA 4X Metallic and Non-Metallic Boxes

4. Wet & Corrosive locations - NEMA 4X Metallic and Non-Metallic

5. Class 1 Division 1 or 2 Group D - NEMA 7

C. Finish: Metallic cabinets shall have a brushed finish

D. Covers: Continuous hinge held closed by flush latch operable by screwdriver or handle

E. Panel for Mounting Terminal Blocks or Electrical Components: 12 gauge steel, white enamel finish

2.2 CONTROL SWITCHES AND PILOT DEVICES

A. Provide in accordance with Section 16490.

2.3 CONTROL RELAYS

A. Provide in accordance with Section 16490.

2.4 TERMINAL BLOCKS

A. Type - Modular construction type, channel mounted, tubular pressure screw connectors

B. Physical

1. Wire Size: 22-10 AWG

2. Rated Voltage: 600 V

3. Rated Current: 30 A

C. Manufacturer

1. Entrelec

2. Or equal

2.5 ALARM HORN

A. Provide in accordance with Section 16490

2.6 ALARM LIGHT

A. Provide in accordance with Section 16490

2.7 FABRICATION

A. Provide 10% spare I/O capacity wired to terminal blocks.

B. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.

C. Provide protective pocket inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.

D. Install a switched light and a convenience receptacle, accessible inside each cabinet.

E. Label all devices, components, and terminal strips. Labels shall not be affixed to devices or components, but rather to the back panel on which the devices and components are mounted. Provide lamicoid tags or equal.

F. Wire all internal panel devices that require field wiring connections to a field wiring terminal strip.

G. Fabricate in accordance with National Electric Code, Article 409 and UL 508.

H. Provide wire markers on each end of each conductor as specified in 16075.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install cabinets and enclosures plumb; anchor securely to structural supports with materials and methods in accordance with Section 16070.

B. Neatly train and lace field wiring and terminate all field wiring on terminal blocks.

C. Clean debris from inside of Control Panels.

D. Clean outside of Control Panels.

E. Repair scratches per manufacturers recommendations.

F. Dented Control Panels shall be replaced.

END OF SECTION

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SECTION 16138

DUCT BANKS

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This section is a part of filed sub-bid Electrical.

1.2 SUMMARY

A. Section Includes

1. Underground conduit – PVC
2. Rigid Steel Conduit
3. Installation of duct banks

B. Related Sections

1. Section 02315 - Excavation, Backfilling and Compaction

1.3 REFERENCES

A. AASHTO - Standard Specification for Highway Bridges

B. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated

C. ANSI/NEMA FB1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

D. ANSI/SCTE 77-2007 - Specification for Underground Enclosure Integrity

1.4 SUBMITTALS

A. Manufacturer's shop drawings

B. Project data

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.6 DELIVERY, STORAGE AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.7 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of duct bank prior to excavation for rough-in.

C. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete duct system.

PART 2 PRODUCTS

2.1 UNDERGROUND CONDUIT - PVC

A. Description: NEMA TC-2 Schedule 40 PVC.

B. Fittings: NEMA TC-3.

2.2 RIGID STEEL CONDUIT

A. Rigid steel conduit: ANSI C80.1

B. Fittings and conduit bodies: ANSI/NEMA FB1; all steel fittings

a. .

PART 3 EXECUTION

3.1 DUCT BANK INSTALLATION

A. Use Schedule 40 PVC conduit for all underground duct banks.

B. Install duct in accordance with manufacturer's instructions.

C. Install duct to locate top of duct bank at depths as indicated on drawings (or at 36 inches below grade depths not indicated on drawings).

D. Install duct with minimum slope of 1.5 inches per 100 feet. Slope duct away from building entrances.

E. Cut duct square using saw or pipe cutter; de-burr cut ends.

F. Insert duct to shoulder of fittings; fasten securely.

G. Join nonmetallic duct using adhesive as recommended by manufacturer.

H. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

I. Install no more than equivalent of three 90 degree bends between pull points.

J. Provide suitable fittings to accommodate expansion and deflection where required.

K. Terminate duct at manhole/handhole entries using end bell.

L. Stagger duct joints vertically in concrete encasement 6 inches minimum.

M. Use suitable separators and chairs installed not greater than 4 feet on centers.

N. Band ducts together before placing concrete.

O. Securely anchor duct to prevent movement during concrete placement.

P. Provide the following:

1. Poured in place concrete in accordance with the provisions of Sections 03100, 03200, and 03300. Use mineral pigment to color concrete red.

2. Minimum 3 inch concrete cover at bottom, top, and sides of duct bank.

3. Two No. 4 steel reinforcing bars in top of bank under paved areas.

4. Connect to existing concrete encasement using dowels.

5. Excavation, backfill and compaction of trenches under provisions of Section 02315.

Q. Provide suitable pull string in each empty duct except sleeves and nipples.

R. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.

3.2 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of exact routing of duct bank.

B. Accurately record actual locations of each manhole and each handhole.

END OF SECTION

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SECTION 16220

AC MOTORS

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical

1.2 SUMMARY

A. Section Includes

1. Three Phase Squirrel Cage Motors

1.3 REFERENCES

A. ANSI/NEMA MG 1 - Motors and Generators.

B. ANSI/NEMA MG 3 – Sound Level Prediction for Installed Rotating Electrical Machines

C. ANSI/NFPA 70 - National Electrical Code.

D. ANSI/IEEE 112 – IEEE Standard for Polyphase Induction Motors and Generators

1.4 SUBMITTALS

A. Factory test reports for all 3-phase motors 20 hp and larger. Test report shall include:

1. No load current
2. Full load current
3. Breakdown torque
4. Locked rotor (starting) current
5. Locked rotor torque
6. Hi-potential test

B. Product data and manufacturer's installation instructions.

C. Operation and maintenance data.

1. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.5 QUALITY ASSURANCE

A. Qualifications - Manufacturer/Company specializing in manufacture of electric motors for industrial use, and their accessories, with minimum 3 years documented product development, testing, and manufacturing experience.

B. Regulatory Requirements

1. Conform to National Electrical Code

2. Conform to local energy code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. General Electric Co., Extra Severe Duty (XSD), energy saver design.

B. Reliance, Model XE-XT.

C. U.S. Motors - Corro-Duty, premium efficiency.

D. Baldor - Super E, hostile environment.

E. or equal.

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Motors - Design for continuous operation in 40 degrees C environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor, and motor enclosure type.

B. Classified Locations – Motors installed within classified locations shall be designed to provide the appropriate NFPA 70 Class and Division protection requirements. Explosion-proof motors shall be UL approved and labeled for hazard classification, with over temperature protection.

C. Visible Nameplate - Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency, AFBMA bearing numbers, manufacture date. Stainless steel nameplate attached with stainless steel pins.

D. Electrical Connection - Oversized, diagonally split, cast-iron junction boxes with gaskets. Box provided with threaded conduit connection. Box shall be adjustable to all four mounting positions.

E. Enclosures – Enclosures for horizontal motors shall be TEFC. Fans for TEFC motors shall be non-sparking bronze-alloy or reinforced plastic. Enclosures for vertical motors shall be WPI.

F. Construction - "Chemical Processing" type.

G. Motors less than 250 watts and intended for intermittent service need not conform to these specifications.

2.3 THREE PHASE SQUIRREL CAGE MOTORS

A. Starting Torque - Between one and one and one-half times full load torque.

B. Starting Current - Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque - NEMA Design B characteristics, unless specified otherwise.

D. Design, Construction, Testing, and Performance - Conform to ANSI/NEMA MG 1 for Design B motors, unless specified otherwise.

E. Insulation System - NEMA Class F or better.

F. Motor Frames - NEMA standard T-frames of all cast iron construction with end brackets of cast iron.

G. Bearings - Double shielded with waterproof non-washing grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 20, L-10 life of 26,280 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension.

H. Sound Power Levels - To ANSI/NEMA MG 3 not over 90 dBa.

I. Nominal Efficiency - Meet or exceed values in this Section at full load and rated voltage when tested in accordance with ANSI/IEEE 112.

J. Vertical Motors - Equip with oil-lubricated thrust bearings.

K. Adjustable Frequency Drive Applications – Motors powered by adjustable frequency drives shall be specifically designed to continuously operate within a 15-60 Hz range for variable torque applications and 20-60 Hz range for constant torque applications. Motors shall be inverter duty rated and shall meet NEMA MG-1 Parts 30 and 31.

PART 3 EXECUTION

3.1 NOMINAL EFFICIENCY – THREE PHASE – TOTALLY ENCLOSED FAN COOLED

HP	3600 RPM	1800 RPM	1200 RPM
1	80.4	85.5	81.5
1½	85.5	86.5	84.0
2	86.5	86.5	86.5
3	88.5	89.5	88.5
5	89.5	90.2	89.5
7½	90.2	91.0	89.5
10	91.0	91.7	90.2
15	91.7	92.4	91.0
20	92.4	93.0	91.7
25	92.4	93.6	93.0

3.2 NOMINAL EFFICIENCY - THREE PHASE - EXPLOSION-PROOF

HP	3600 RPM	1800 RPM	1200 RPM

HP	3600 RPM	1800 RPM	1200 RPM
½	68	74	71
¾	72	76	72
1	80.4	85.5	87.5
1½	85.5	86.5	88.5
2	86.5	86.5	89.5
3	88.5	89.5	89.5
5	89.5	89.5	89.5
7½	90.2	91	91.7
10	91.0	91.7	91.7
15	91.7	92.4	92.4
20	92.4	93.0	92.4
25	93.0	93.6	93.0

END OF SECTION

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SECTION 16265

AC ADJUSTABLE FREQUENCY DRIVES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical

1.2 SUMMARY

A. Section Includes

1. AC adjustable frequency drives.

1.3 REFERENCES

A. ANSI/NEMA ICS 3 - Industrial Systems

B. NEMA ICS 3.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.

C. IEEE 519 - Guide for Harmonic Control and Reactive Compensation of Static Power Converters.

1.4 SUBMITTALS

A. Shop drawings, product data and reports.

B. Invoice for each drive to comply with terms of the utility company's rebate program.

C. Wiring diagrams.

D. Operation and Maintenance Data

1. Submit instruction manuals with recommended maintenance procedures and intervals, installation, operation and programming information.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store drive in a warm, dry, non-corrosive location in original shipping carton to prevent damage.

1.6 SPARE PARTS

A. One printed circuit board control card of each type furnished.

B. Six fuses of each type furnished.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Eaton: SVX-9000

B. Square D: ATV 61, ATV 71

C. Allen-Bradley: Powerflex 700

D. General Electric: AF-600FP

E. or approved equivalent.

2.2 AC ADJUSTABLE FREQUENCY DRIVE

A. The adjustable frequency AC drive shall convert 3 phase, 60 hertz input power to an adjustable AC frequency and voltage for controlling the speed of AC squirrel cage motors. The converter shall use a diode bridge rectifier to convert incoming AC power to a constant DC voltage bus. The inverter section shall be a voltage source design with a sine-weighted pulse-width modulated output. The output voltage is to vary proportionally with the output frequency to maintain a constant volts/hertz value up to 60 hz.

B. Include in the controller, power conversion components, power control logic devices and regulator circuitry. Provide full digital control of frequency and voltage.

C. The adjustable frequency drives shall all be by one manufacturer and shall be an integral part of the motor control centers.

D. Provide AFDs large enough to handle the nameplate full load current of the installed motor; do not select AFDs based solely on motor HP. Verify the nameplate full load current of the installed motor and provide the appropriately sized AFD for the installed motor.

E. The variable torque drives shall be rated for 100% continuous current, 110% current for one minute. Constant torque drives shall be rated for 100% continuous current, 150% current for one minute.

F. The drive shall also include as functional components: capacitors for DC bus, single control logic board, terminal blocks for connection of incoming power, motor terminations, operator controls and transient suppressor.

G. Include motor current overload protection.

H. Provide keypad for display and control, to be mounted on the front panel of the motor control center.

I. Provide 3% line reactor.

J. Provide a fused surge protection device for AFD power; the surge protection device rating shall be as recommended by the AFD manufacturer.

2.3 ADJUSTABLE DRIVE FUNCTIONS

A. Frequency Accuracy $\pm 0.5\%$.

B. Operating Frequency Range Output: 0-60 Hz.

C. Adjustable Two Step Acceleration and Deceleration Times: 0.1-1600 seconds.

D. Lower Limit Frequency Adjustment: 0-60 Hz.

E. Upper Limit Frequency Adjustment: 0-60 Hz.

2.4 ADJUSTABLE DRIVE CONTROLS

A. Speed control, start/stop control, local/remote control on keypad.

B. Manual speed adjustment potentiometer, 10 turn, with dial counter, (remote mounted where indicated on Drawings).

C. Remote speed adjustment from 4-20 mA control signal, where indicated.

D. Remote start/stop.

E. Drive run and stop indicating lights.

F. Contact closure for external indication of drive running and fault (rating 120 VAC, 1 AMP).

G. Elapsed time meter.

H. Controls as indicated on Drawings.

2.5 ADJUSTABLE DRIVE DIAGNOSTICS

A. Provide LED indicators for the following drive failures:

1. Over-current

2. Over-voltage

3. Under-voltage

4. Over-temperature

5. Overload.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install drive equipment in motor control centers and/or control panels as shown on the Drawings.

B. Provide services of a factory trained technician for startup and training, a minimum of one day per type of drive installed, per location.

END OF SECTION

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SECTION 16490

COMPONENTS AND ACCESSORIES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed sub-Bid - Electrical.

1.2 SUMMARY

A. Section Includes

1. Control switches and pilot devices
2. Control relays, time delay relays
3. Control power transformers
4. Audible alarm devices
5. Intrinsically safe barrier for float switches
6. Current monitoring relay
7. Exterior alarm horn
8. Exterior alarm strobe light

1.3 REFERENCES

A. NEMA ICS 1 - General Standards for Industrial Control Systems

B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies

1.4 SUBMITTALS

A. Drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, wire numbers, dimensions, support points, nameplate legends

B. Project Record Documents

1. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

C. Operation and Maintenance Data

1. Provide instructions for adjusting and resetting time delay relays, timers, and counters.
2. Provide recommended preventive maintenance procedures and materials.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience

1.6 SPARE PARTS

A. Furnish 2 complete control switches, pilot devices, and relays with contacts for each type utilized in this project.

B. Furnish 1 complete time delay relay and clock timer complete with contacts for each type utilized in this project.

PART 2 PRODUCTS

2.1 CONTROL SWITCHES AND PILOT DEVICES

A. Contact: NEMA ICS 2; Form C

B. Contact Rating: NEMA ICS 2; A150, 10 amps

C. Type: Industrial heavy duty oil tight type, waterproof (NEMA 4) or explosion proof (NEMA 7) as required and/or indicated on the Drawings, pushbuttons, selector switches, and stop buttons

D. Indicating Lights: Transformer type, Push-to-Test LED, lens color as indicated on Drawings

E. Legend Plates with markings and weatherproof requirements as indicated on the Drawings

F. Manufacturers

1. Eaton/Cutler-Hammer, Model 10250T

2. Equivalent by Square D

3. Equivalent by General Electric

4. or equal

2.2 CONTROL RELAYS, TIME DELAY RELAYS

A. Contact: NEMA ICS 2; Form C, convertible

B. Contact Rating: NEMA A600, P600, 10 Amp, 300V AC/DC convertible

C. Coil Voltage: 120 volts, 60 Hz., AC

D. Relay: industrial, heavy duty, rail mounted

E. Manufacturers

1. Eaton/Cutler Hammer M600

2. General Electric C4122A

3. Allen Bradley Type N

4. or equal

2.3 CONTROL POWER TRANSFORMERS

A. Transformer: NEMA ST 1; machine tool transformer with isolated secondary winding

B. Power Rating: 75 va, minimum

C. Voltage Rating: 480 volts primary; 120 volts secondary

2.4 AUDIBLE ALARM DEVICES

A. Type: Solid State audible electric signaling device

B. Voltage: 120V

C. Output: 80-95 dB at 2 feet

D. Manufacturers

1. Mallory Type SC11ON

2. or equal

2.5 INTRINSICALLY SAFE BARRIER FOR FLOAT SWITCHES

A. Description: Intrinsically safe barrier

B. Voltage: 120 volts

C. Number of Inputs: 6

D. Outputs: 6 isolated NO/NC contacts rated 5A, 120 volts

E. Manufacturer

1. Sun State systems - Safetrakker Model 4000

2. or equal

2.6 ALARM BELL

A. Description: 152 mm AC vibrating bell, weatherproof

B. Finish Color: Beige

C. Voltage: 120 volts

D. Output: 81 dB/95 dBA

E. Accessories: Yardhood

F. Manufacturer

1. Simplex 2901 Series

2. or equal

2.7 ALARM LIGHT

A. Description: Weatherproof, corrosion resistant, Class 1, Division 2, wall mounted indicating light, enclosed and gasketed

B. Voltage: 120 volts

C. Globe: Red polycarbonate

D. Connections: ¾ inch conduit

E. Lamp: 75 watt incandescent

F. Manufacturer

1. Crouse Hinds - Cat. No. VG2759 with Cat. No. V475 globe

2. Or equal

2.8 EXTERIOR ALARM HORN

A. Type: Diaphragm NEMA 4X

B. Construction: Zinc die-casting housing, stainless steel diaphragm, weatherproof back box

C. Voltage: 120 VAC

D. Output: Adjustable, 78 to 101 dB (at 10 feet)

E. Manufacturer

1. Edwards Signaling, Model 870P-N5 120 VAC model

2.9 EXTERIOR ALARM STROBE LIGHT

A. Type: Strobe

B. Description: Xenon flash tube, solid state circuitry, polycarbonate fresnel dome, zinc die cast base painted with corrosion resistant polyurethane, UL listed for outdoor use

C. Flash Rate: 75 to 90 per minute

D. Candlepower: 300 effective, peak 1,000,000

E. Mounting: ½ inch diameter pipe

F. Color: Red

G. Power: 120 volts, AC

H. Manufacturer

1. Federal Signal "Fireball"

2. or equal

PART 3 EXECUTION

3.1 INSTALLATION

A. Install devices and equipment in accordance with manufacturer's instructions.

B. Install individual relays and time delay relays in enclosures.

C. Make electrical wiring interconnections as shown on Drawings.

END OF SECTION

SECTION 16500

LUMINAIRES

PART 1 GENERAL

1.1 SUB-BID REQUIREMENTS

A. This Section is part of filed Sub-Bid - Electrical.

1.2 SUMMARY

A. Section Includes

1. Emergency lighting units

1.3 SUBMITTALS

A. Dimensions and components for each luminaire.

B. Dimensions, ratings, and performance data.

C. Instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents

1. Accurately record actual locations of each luminaire.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.5 SPARE PARTS

A. Provide 1 replacement lamp for each lamp installed.

B. Provide 2 of each ballast type.

PART 2 PRODUCTS

2.1 EMERGENCY LIGHTS

A. Manufacturers

1. Dual-Lite
2. Exide
3. Lithonia
4. Or equal

B. Description: Self-contained emergency lighting unit.

C. Battery: 6 volt, lead calcium type, with 1.5 hour capacity at 110 watt.

D. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.

E. Lamps type in nickel or chrome plated steel housing.

F. Remote lamps: Match lamps on unit.

G. Housing:

1. Steel with gray hammer tone finish with wall mounting shelf bracket

2. White thermoplastic, impact resistant, flame retardant and UV stable.

H. Environment rating (wet, damp, etc.) shall be suitable for the specific installation location.

I. Indicators: Provide lamps to indicate AC ON and RECHARGING. Provide voltmeter.

J. Provide TEST switch to transfer unit from external power supply to integral battery supply.

K. Voltage: 120 volts

2.2 EXIT SIGN

A. Manufacturers

1. Dual-Lite

2. Exide

3. Lithonia

4. Or equal

B. Description: LED exit sign with battery back-up

C. Battery: Maintenance free and suitable for 90 minutes of operation

D. Mounting: Surface wall mounted or ceiling mounted as indicated on the Drawings

E. Housing: Impact-resistant and scratch resistant white thermoplastic

F. Lamp: LED

G. Voltage: 120 volts

H. Lettering: Red on white background

I. Faces: Single or two-sided as indicated on the Drawings

J. Directional arrows: As indicated on the Drawings

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate and supporting grids for luminaires.

B. Examine each luminaire to determine suitability for lamps specified.

3.2 INSTALLATION

A. Install in accordance with manufacturers instructions, NEC, and as indicated on Drawings.

B. Install suspended luminaires using pendants supported from swivel hangers. 200 free swing, ½ inch hub, 500 pound fixture weight. Provide pendant length required to suspend luminaire at indicated height.

C. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

D. Install accessories furnished with each luminaire.

E. Unless otherwise shown, connect emergency lighting units and exit signs to same circuit that feeds the surrounding lighting. Use flexible conduit as indicated.

F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install specified lamps in each luminaire, emergency lighting unit and exit sign after installation of luminaire is completed and prior to project completion.

3.3 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Adjust exit sign directional arrows as indicated.

B. Relamp luminaires that have failed lamps at Substantial Completion.

3.5 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean finishes and touch up damage.

END OF SECTION

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