
**Project Manual
for
Generator Replacement at Salt Works and
Terry Lane Pump Stations**

Wareham, Massachusetts

**Volume I of I
Contract No. 2020-WW-01**



1545 Iyannough Road - Route 132
Hyannis, Massachusetts

2020



**PROJECT MANUAL
FOR
GENERATOR REPLACEMENT AT SALT WORKS AND TERRY LANE PUMP STATIONS**

**TOWN OF WAREHAM, MASSACHUSETTS
CONTRACT NO. 2020-WW-01**

VOLUME I OF I

**GHD Inc.
1545 Iyannough Road
Hyannis, Massachusetts 02601**

2020

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INVITATION TO BID
GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS
TOWN OF WAREHAM, MASSACHUSETTS
CONTRACT NO. 2020-WW-01

Sealed Bids for General Contractors for the construction of the Generator Replacement at Salt Works Road and Terry Lane Pump Stations for the Town of Wareham, MA will be received by the Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, Massachusetts, Attn: Guy Campinha, Director of Water Pollution Control until 2:00 p.m. local time on December 1, 2020 and at that place and time will be publicly opened and read aloud.

Filed subcontractor sealed bids designated herein for construction of 2020-WW-01 Generator Replacement at Salt Works Road and Terry Lane Pump Stations for the Town of Wareham, Massachusetts will be received by the Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, Massachusetts, Attn: Guy Campinha, Director of Water Pollution Control until 2:00 p.m. local time on November 17, 2020 and at that place and time will be publicly opened and read aloud.

The Work consists of installation of sewer pumping station standby generators in accordance with the Bidding Documents heretofore prepared by GHD Inc. 300 calendar days will be allowed for contractor to achieve substantial completion and an additional 60 calendar days to achieve final completion.

The Town of Wareham is the Issuing Office for this Project. The Contract Documents may be examined at the following locations after 2:00 p.m. on October 28, 2020:

Wareham Water Pollution Control Facility
6 Tony's Lane
Wareham, MA 02571

The electronic documents can be obtained online after 2:00 p.m. on October 28, 2020 at <https://www.wareham.ma.us/bids-rfps>.

All questions shall be submitted in writing to Guy Campinha, Director of Water Pollution Control at gcampinha@wareham.ma.us. The subject heading for all e-mails and faxes shall be:

GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS

No response will be given to questions received less than seven (7) days before the Bid opening date.

Bidders shall review and acknowledge all Addenda on the Bid Form.

The Project is being bid under the provisions of M.G.L. c.149, s44D. Bidding and award of this Contract shall be required to comply with Massachusetts General Law Chapter 149, Section 44A-44J, and all other applicable Massachusetts General Laws.

Each General and Filed Sub-bidder's Bid must be accompanied by Bid security made payable to Owner in an amount of 5-percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.

Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, 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. The Contract Work Hours Act of 1962 regarding overtime compensation applies to this project.

In accordance with M.G.L. Chapter 149, Section 44D, ALL bids will be valid only when accompanied by a current certificate of eligibility and update statement issued by the Division of Capital Asset Management and Maintenance (DCAMM), showing that the General Bidder has the classification of Pump Stations, and that the Filed Sub Bidders have the classification matching the Filed Sub-Bid being submitted.

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. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project.

If, upon acceptance of a Bid, a Bidder fails to enter into a Contract with the Town of Wareham, the Bid security shall be forfeited to and become the property of the Town.

No Bidder may withdraw its Bid within 60 days after the date of the Bid opening. The successful Bidder must furnish a 100% Performance Bond and a 100% Payment Bond with a surety company satisfactory to the Town of Wareham and conforming to the prerequisite requirements of Article 5 of the General Conditions.

Each General Bid and sub bid shall be submitted in accordance with the Instructions to Bidders. The following are the filed sub-bids required for the work:

1. Electrical
2. Miscellaneous and Ornamental Iron

The Town of Wareham reserves the right to waive any informalities or to reject any or all Bids.

Bidders are required to certify, under penalty of perjury, that Bids have been prepared without collusion with other Bidders, subcontractors, suppliers, etc. This certification is included with the Bid Form and each Bidder must sign in the space provided.

A mandatory Pre Bid Conference will be held at 10:00 a.m. on November 5, 2020 at the Wareham Wastewater Treatment Facility on Tony's Lane in Wareham, MA. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference.

Dated: October 28, 2020

SECTION 00100

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

- 1.01. Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. The Issuing Office for this project is the Town of Wareham, Massachusetts, Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, MA 02571.
 - B. Prefixes to Referenced Paragraph Numbers are as follows:
 - General Conditions; "GC-____."
 - Supplementary Conditions; "SC-____."

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.01. Complete sets of the Bidding Documents as stated in the advertisement may be obtained from the Issuing Office.
- 2.02. Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01. To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence that he has been certified by the Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance and is listed on the most current list for the relevant category.
- 3.02. Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

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

- 4.01. Subsurface and Physical Conditions
- A. The Supplementary Conditions identify:
 - 1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous 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).
 - B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents. Bidder is responsible for any interpretation or conclusion Bidder draws from any

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INSTRUCTIONS TO BIDDERS

data, interpretations, opinions, or information contained in such reports, or shown or indicated in such drawings.

4.02. Underground Facilities

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

4.03. Hazardous Environmental Condition

- A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
- B. Copies of such reports and drawings referenced in Paragraph 4.03A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents. Bidder is responsible for any interpretation or conclusion Bidder draws from any data, interpretations, opinions, or information contained in such reports, or shown or indicated in such drawings.

4.04. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 4.06 of the General Conditions.

4.05. On written request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

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

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
- D. consider the information known to Bidder; 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, including

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INSTRUCTIONS TO BIDDERS

applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;

- E. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
 - F. 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;
 - G. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
 - 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; and
 - I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.07. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

- 5.01. A non-mandatory pre-bid conference will be held as stated in the Invitation to Bid.

ARTICLE 6 - SITE AND OTHER AREAS

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

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INSTRUCTIONS TO BIDDERS

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

- 7.01. All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer 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. Questions received less than seven (7) business days prior to Bid Opening or as modified in subsequent Addenda will not be answered.
- 7.02. Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8 - BID SECURITY

- 8.01. A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02. The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award and the Bid Security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 46 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03. Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

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

ARTICLE 10 - LIQUIDATED DAMAGES

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

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

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

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INSTRUCTIONS TO BIDDERS

ARTICLE 12 - PREPARATION OF BID

- 12.01. A Bid Form, attached certifications, etc. are included in the electronic copy of the Bidding Documents. **An unbound copy of the Bid Forms and attachments shall be printed and used to prepare the Bid.**
- 12.02. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each Bid Item listed therein. In the case of optional alternatives, the words "No Bid," "No Change," or "Not Applicable" may be entered.
- 12.03. A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 12.04. A Bid by a partnership shall 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.
- 12.05. A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06. A Bid by an individual shall show the Bidder's name and official address.
- 12.07. A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid form. The official address of the joint venture must be shown.
- 12.08. All names shall be printed in ink below the signatures.
- 12.09. The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.10. Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 12.11. The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state Contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 13 - BASIS OF BID; COMPARISON OF BIDS

13.01 Lump Sum

- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate if applicable described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate. In the comparison of Bids, alternates will be applied in the same order as listed in the Bid form.

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INSTRUCTIONS TO BIDDERS

ARTICLE 14 - SUBMITTAL OF BID

- 14.01. With each copy of the Bidding Documents, a Bidder is furnished one copy of the Bid Form, and, if required, the Bid Bond Form. The copy of the Bid Form is to be completed and submitted with the Bid security and all required attachments to the Bid stated in the Bid Form.
- 14.02. A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation **“BID ENCLOSED – GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS, WAREHAM, MA.”**

ARTICLE 15 - MODIFICATION AND WITHDRAWAL OF BID

- 15.01. A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 15.02. If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 16 - OPENING OF BIDS

- 16.01. Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 18.02. More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

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Generator Replacement at Salt Works Road and Terry Lane Pump Stations

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INSTRUCTIONS TO BIDDERS

- 18.03. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 18.04. Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, individuals, or entities to perform the Work in accordance with the Contract Documents.

ARTICLE 19 - CONTRACT SECURITY AND INSURANCE

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

ARTICLE 20 - SIGNING OF AGREEMENT

- 20.01. When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within ten days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within five days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 21 - COPIES OF CONTRACT DOCUMENTS

- 21.01. Owner will furnish copies of Contract Documents to Contractor as follows:

4 sets of full-size drawings.
4 sets of bound Contract Documents.

ARTICLE 22 - SALES AND USE TAXES

- 22.01. 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. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.

ARTICLE 23 - FUNDING REQUIREMENTS

- 23.01. This project is subject to Massachusetts Prevailing Wage Rates. Applicable wage rates are included with the Contract Supplementary Conditions.

ARTICLE 24 - MBE/WBE REQUIREMENTS

- 24.01. None.

END OF SECTION

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Generator Replacement at Salt Works Road and Terry Lane Pump Stations

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00100-7

INSTRUCTIONS TO BIDDERS

**FORM FOR GENERAL BID
FOR
CONSTRUCTION OF CONTRACT 2020-WW-01
GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS
WAREHAM, MASSACHUSETTS**

THIS BID IS SUBMITTED TO:

Water Pollution Control Facility
6 Tony's Lane
Wareham, MA 02571

- A. The Undersigned proposes to furnish all labor and materials required for Generator Replacement at Salt Works and Terry Lane Pump Stations (project) in Town of Wareham, Massachusetts, in accordance with the accompanying plans and specifications prepared by GHD Inc. for the contract price specified below, subject to additions and deductions according to the terms of the specifications.
- B. This bid includes addenda numbered _____ to _____
- C. The proposed contract price is _____ dollars (\$_____). Total of Items 1 and 2.
- D. The subdivision of the proposed contract price is as follows:

Item 1. The work of the general contractor, being all work other than that covered by Item 2.
\$_____ and consisting of the following:

Bid Item No. 1: Mobilization \$_____

Bid Item No. 2: Generator and Structure at Salt Works Road Station
\$_____

Bid Item No. 3: Generator and Structure at Terry Lane Station
\$_____

Item 2. Sub-bids as follows:

Sub-trade	Name of Sub-bidder	Amount	Bonds required, (indicate by "Yes" or "No")
<u>F-1 Miscellaneous and Ornamental Iron</u>	_____	\$ _____	_____
<u>F-2 Electrical</u>	_____	\$ _____	_____
	Total of Item 2	\$ _____	

The undersigned 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. The undersigned 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.

The undersigned agrees that if he is selected as general contractor, he will promptly confer with the awarding authority on the question of sub-bidders; and that the awarding authority may substitute for any sub-bid listed above a sub-bid filed with the awarding authority by another sub-bidder for the sub-trade against whose standing and ability the undersigned makes no objection; and that the undersigned 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.

- E. The undersigned agrees that, if he is selected as general contractor, he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price; provided, however, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

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

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

- F. If Contract is awarded, successful Bidder will submit a Payment Bond in the amount of 100% of the total contract price.
- G. If Contract is awarded, successful Bidder will submit a Performance Bond in the amount of 100% of the total contract price.
- H. Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within the number of calendar days indicated in the Agreement. The time of completion of this contract is 300 days for Substantial Completion after the date contained in the Notice to Proceed, and 360 days for completion and final payment.
- I. Bidder accepts the provisions of the Agreement as to liquidated damages. Liquidated damages specified in this contract are \$1,250 per day for each calendar day beyond the Substantial Completion date that Work remains uncompleted and \$500 per day for each calendar day beyond the date for completion and final payment.

J. Attachments to this Bid

The following documents are submitted with and made a condition of this Bid:

1. Bid Form.
2. Non-Collusive Bidding Certification
3. Required Bid Security in the form of a Bid Bond or certified check, or money order.
4. Statement of Surety's Intent (if Bid Security is to be Certified or Bank Cashier's Check).
5. Certification: Division of Capital Asset Management and Maintenance.

Date _____

(Name of General Bidder)

By _____
(Signature)

Printed Name _____
(Name of Person Signing Bid and Title)

(Business Address)

(City and State)

NON-COLLUSIVE BIDDING CERTIFICATION

Section 103-d of the General Municipal Law requires the following statement subscribed by the bidder as true under the penalties of perjury: Non-Collusive Bidding Certification.

(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in a case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

Section 103-d of the General Municipal Law, as amended by Chapter 675 L 1966, in addition to requiring the above certification, provides as follows:

(b) A bid shall not be considered for award nor shall any award be made where (1), (2) and (3) above have not been complied with; provided however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (1), (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items or has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bids and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

NON-COLLUSIVE BIDDING CERTIFICATION (continued)

Dated: _____, 20____

Signed Name _____

Title _____

Company _____

Address _____

Corporate Seal

ATTACH BID SECURITY TO THIS PAGE
IF CERTIFIED CHECK

STATEMENT OF SURETY'S INTENT
(To be completed if Bid Security is to be Certified or Bank Cashier's Check)

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if for any reason we do not execute the requisite bonds.

We are duly authorized to do business in the State of _____ .

Attest:

Surety's Authorized Signature(s)

Attach Power of Attorney

(Corporate seal if any. If no seal, write
"No Seal" across this place and sign.)

(This form must be completed prior to the submission of the bid.)

Division of Capital Management

In accordance with M.G.L. Chapter 149, Section 44D, ALL bids will be valid only when accompanied by a current certificate of eligibility and update statement issued by the Division of Capital Asset Management, showing that the Bidder has the classification of **Pump Stations** and the capacity to perform the work required.

SUB-BID FORM

FORM FOR SUB-BID
as required by Chapter 149 Section 44F
FOR
CONSTRUCTION OF CONTRACT NO. 2020-WW-01
GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS
WAREHAM, MA

THIS BID IS SUBMITTED TO:

Water Pollution Control Facility
6 Tony's Lane
Wareham, MA 02571

To all General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section No. 05001 MISCELLANEOUS AND ORNAMENTAL IRON of the specifications and in any plans specified in such section, prepared by GHD Inc. for the Generator Replacement at Salt Works Road and Terry Lane Pump Stations Project (project) in the Town of Wareham, Massachusetts:

1. BI-F1A - For the Salt Works Road Pump Station, the contract sum of _____ dollars
(\$_____).

2. BI-F1B - For the Terry Lane Pump Station, the contract sum of _____ dollars
(\$_____).

BI-F1 - For a Total contract sum of (BI-F1A and BI-F1B)
_____ dollars
(\$_____).

B. This sub-bid includes addenda numbered _____ to _____

C. 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 C if no general bidders are excluded.]

SUB-BID FORM

- D. The undersigned agrees that, if he is selected as a sub-bidder, he will, within 5 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, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by the general bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.
- E. The names of all persons, firms and corporations furnishing to the undersigned 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 if customarily furnished by persons on his 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.]

- F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore-described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.
- G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore-described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the owner.
- H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name _____ years.
2. Ever failed to complete any work awarded? _____
3. List one or more recent buildings with names of the general contractor and architect on which you served as a sub-contractor for work of similar character as required for the above-named building.

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

4. Bank reference _____

SUB-BID FORM

- I. 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 of subcontracts subject to section forty-four F.

The undersigned 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. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section 29 F of chapter 29, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

J. Attachments to this Bid

The following documents are submitted with and made a condition of this Bid:

1. Bid Form.
2. Non-Collusive Bidding Certification
3. Required Bid Security in the form of a Bid Bond or certified check, or money order.
4. Statement of Surety's Intent (if Bid Security is to be Certified or Bank Cashier's Check).
5. Certification: Division of Capital Asset Management and Maintenance.

Date _____

(Name of Sub-bidder)

By _____
(Signature)

Printed Name _____
(Title and Name of Person Signing Bid)

(Business Address)

(City and State)

NON-COLLUSIVE BIDDING CERTIFICATION

Section 103-d of the General Municipal Law requires the following statement subscribed by the bidder as true under the penalties of perjury: Non-Collusive Bidding Certification.

(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in a case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

Section 103-d of the General Municipal Law, as amended by Chapter 675 L 1966, in addition to requiring the above certification, provides as follows:

(b) A bid shall not be considered for award nor shall any award be made where (1), (2) and (3) above have not been complied with; provided however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (1), (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items or has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bids and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

ATTACH BID SECURITY TO THIS PAGE
IF CERTIFIED CHECK

STATEMENT OF SURETY'S INTENT
(To be completed if Bid Security is to be Certified or Bank Cashier's Check)

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if for any reason we do not execute the requisite bonds.

We are duly authorized to do business in the State of _____ .

Attest:

Surety's Authorized Signature(s)

Attach Power of Attorney

(Corporate seal if any. If no seal, write
"No Seal" across this place and sign.)

(This form must be completed prior to the submission of the bid.)

Division of Capital Management

In accordance with M.G.L. Chapter 149, Section 44D, ALL bids will be valid only when accompanied by a current certificate of eligibility and update statement issued by the Division of Capital Asset Management, showing that the Bidder has the classification of **Miscellaneous and Ornamental Iron** and the capacity to perform the work required.

SUB-BID FORM

FORM FOR SUB-BID
as required by Chapter 149 Section 44F
FOR
CONSTRUCTION OF CONTRACT NO. 2020-WW-01
GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS
WAREHAM, MA

THIS BID IS SUBMITTED TO:

Water Pollution Control Facility
6 Tony's Lane
Wareham, MA 02571

To all General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section No. 16001 ELECTRICAL WORK – GENERAL of the specifications and in any plans specified in such section, prepared by GHD Inc. for the Generator Replacement at Salt Works Road and Terry Lane Pump Stations (project) in the Town of Wareham, Massachusetts:

1. BI-F2A - For Salt Works Road Pump Station, the contract sum of _____ dollars
(\$_____).

2. BI-F2B - For Terry Lane Pump Station, the contract sum of _____ dollars
(\$_____).

BI-F2 - For a Total contract sum of (BI-F2A and BI-F2B) _____ dollars
(\$_____).

B. This sub-bid includes addenda numbered _____ to _____

C. 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 C if no general bidders are excluded.]

SUB-BID FORM

- D. The undersigned agrees that, if he is selected as a sub-bidder, he will, within 5 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, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by the general bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.
- E. The names of all persons, firms and corporations furnishing to the undersigned 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 if customarily furnished by persons on his 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.]

- F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore-described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.
- G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore-described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the owner.
- H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name _____ years.
2. Ever failed to complete any work awarded? _____
3. List one or more recent buildings with names of the general contractor and architect on which you served as a sub-contractor for work of similar character as required for the above-named building.

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

4. Bank reference _____

SUB-BID FORM

I. 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 of subcontracts subject to section forty-four F.

The undersigned 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. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section 29 F of chapter 29, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

J. Attachments to this Bid

The following documents are submitted with and made a condition of this Bid:

1. Bid Form.
2. Non-Collusive Bidding Certification
3. Required Bid Security in the form of a Bid Bond or certified check, or money order.
4. Statement of Surety's Intent (if Bid Security is to be Certified or Bank Cashier's Check).
5. Certification: Division of Capital Asset Management and Maintenance.

Date _____

(Name of Sub-bidder)

By _____
(Signature)

Printed Name _____
(Title and Name of Person Signing Bid)

(Business Address)

(City and State)

NON-COLLUSIVE BIDDING CERTIFICATION

Section 103-d of the General Municipal Law requires the following statement subscribed by the bidder as true under the penalties of perjury: Non-Collusive Bidding Certification.

(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in a case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

Section 103-d of the General Municipal Law, as amended by Chapter 675 L 1966, in addition to requiring the above certification, provides as follows:

(b) A bid shall not be considered for award nor shall any award be made where (1), (2) and (3) above have not been complied with; provided however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (1), (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items or has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bids and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

NON-COLLUSIVE BIDDING CERTIFICATION (continued)

Dated: _____, 20____

Signed Name _____

Title _____

Company _____

Address _____

Corporate Seal

ATTACH BID SECURITY TO THIS PAGE
IF CERTIFIED CHECK

STATEMENT OF SURETY'S INTENT
(To be completed if Bid Security is to be Certified or Bank Cashier's Check)

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if for any reason we do not execute the requisite bonds.

We are duly authorized to do business in the State of _____ .

Attest:

Surety's Authorized Signature(s)

Attach Power of Attorney

(Corporate seal if any. If no seal, write
"No Seal" across this place and sign.)

(This form must be completed prior to the submission of the bid.)

Division of Capital Management

In accordance with M.G.L. Chapter 149, Section 44D, ALL bids will be valid only when accompanied by a current certificate of eligibility and update statement issued by the Division of Capital Asset Management, showing that the Bidder has the classification of **Electrical** and the capacity to perform the work required.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is by and between the TOWN OF WAREHAM, MASSACHUSETTS (“OWNER”) and _____ (“CONTRACTOR”), OWNER and CONTRACTOR, hereby agree as follows:

ARTICLE 1 - WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The work of this project consists of the demolition of existing generators and providing new generators for the Salt Works Road pumping station and for the Terry Lane sewage pumping station.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Generator Replacement at Salt Works Road and Terry Lane Pump Stations
Contract 2020-WW-01
Town of Wareham, Massachusetts

ARTICLE 3 - ENGINEER

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

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

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

4.02 Dates for Substantial Completion and Final Payment

- A. The Work shall be substantially completed on or before the following dates.
 - 1. **300 calendar days from Notice to Proceed.**

- B. The Work shall be complete and ready for final payment in accordance with paragraph 14.07 of the General Conditions on or before **360 calendar days from Notice to Proceed**.

4.03 Liquidated Damages

- A. CONTRACTOR and OWNER recognize that time is of the essence as stated in Paragraph 4.01 above and of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER \$1,250 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER \$500 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the amounts determined pursuant to Paragraph 5.01.A below:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Final Payment

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

ARTICLE 7 - INTEREST

7.01 Not Applicable.

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

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

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

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 1. This Agreement (pages 1 to 8, inclusive).
 2. Exhibits to this Agreement as follows:
 - a. Exhibit "A"; Notice of Award and Notice to Proceed.
 - b. Exhibit "B"; Performance and Payment Bonds.
 - c. Exhibit "C"; Certificates of Insurance.
 - d. Exhibit "D"; Identification of Drawings.
 - e. Exhibit "E"; Contract Supplement.
 - f. Exhibit "F"; Permits.
 3. General Conditions (pages 1 to 49, inclusive).
 4. Supplementary Conditions (pages 00800-1 to 00800-17, inclusive).
 5. Specifications as listed in the table of contents of the Project Manual.
 6. Contract Drawings.
 7. Addenda (___ to ___, inclusive).
 8. Additional Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages _____ to _____, inclusive).
 - b. Documentation submitted by Contractor prior to Notice of Award (pages ___ to ___, inclusive).
 9. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.

- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

10.05 Contractor's 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 10.05:

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.

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

This Agreement will be effective on _____, 20____, (which is the Effective Date of the Agreement).

OWNER: Town of Wareham, MA

Signature

By: _____
Derek Sullivan
Town Administrator

CONTRACTOR: (SEAL)

Signature

By: _____ Contractor Name: _____

Name

Title

Address

Telephone

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

Approved as to Form:

Certified in accordance with Chapter 44, Section 31C and based upon Engineering estimates

Richard Bowen
Town Counsel

Judith Lauzon
Town Accountant

Signature

EXHIBIT A

**NOTICE OF AWARD
NOTICE TO PROCEED**

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) will be forwarded under separate cover by GHD Inc.

_____ 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 19), 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

EXHIBIT B

**PERFORMANCE BOND
PAYMENT BOND**

PERFORMANCE BOND

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

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

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.
2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 3.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
 - 3.3 Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract; or
 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 4.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
5. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 6.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
 - 6.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
 - 6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.
7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the 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 Owner or its heirs, executors, administrators, or successors.
8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.
9. 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 Contractor Default or within two years after Contractor ceased working or within two years after 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
- 12.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
 - 12.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
 - 12.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (Name, Address and Telephone)

Surety Agency or Broker:

Owner's Representative (Engineer or other party):

PAYMENT BOND

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

CONTRACTOR (*Name and Address*):

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

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
 - 6.1 Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2 Pay or arrange for payment of any undisputed amounts.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to

the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

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

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, 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 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.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

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

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms “labor, materials or equipment” that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and 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.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (Name, Address and Telephone)

Surety Agency or Broker:

Owner’s Representative (Engineer or other):

EXHIBIT C

CERTIFICATES OF INSURANCE

EXHIBIT D

IDENTIFICATION OF DRAWINGS

EXHIBIT D

IDENTIFICATION OF CONTRACT DRAWINGS

The Contract Drawings show the character and scope of the work to be performed and have been prepared or approved by ENGINEER. The drawings, all of which constitute an integral part of the Contract Documents as approved for construction on the date so designated on said drawings, carry the ENGINEER's identifying Job No. 11206153.

EXHIBIT E
CONTRACT SUPPLEMENT

CONTRACT SUPPLEMENT

**STATUTORY PROVISIONS
FOR
MASSACHUSETTS PUBLIC
CONSTRUCTION CONTRACTS**

CONTRACT SUPPLEMENT

STATUTORY PROVISIONS FOR MASSACHUSETTS PUBLIC CONSTRUCTION CONTRACTS

The following provisions are required by or are intended to be consistent with requirements of Massachusetts statutes governing public works construction contracts in the Commonwealth of Massachusetts. Any other provisions required by statute to be included herein shall be deemed to be so included, and are incorporated herein by reference as if set forth herein in full. In addition, the parties recognize that the other rights, duties and obligations with respect to public construction contracts are provided for by statute, notwithstanding the fact that they are not provided for in the Contract Documents. In the case of conflict between the provisions in the Contract Documents, the provisions of this Contract Supplement shall govern. In the case of conflict between the provisions of this Contract Supplement and the provisions of any applicable statute, the statutory provisions shall govern.

Each of the Owner and the Contractor agree, notwithstanding any other term or provision of the Contract Documents, as follows:

1. Definitions. Pursuant to the provisions added to the Contract Documents by this Contract Supplement as required by applicable provisions of the Massachusetts General Laws the terms "awarding authority" and "contracting authority" shall mean the Owner, the term "Commonwealth" shall mean the "Commonwealth of Massachusetts, the terms "contract" and "contract documents" shall mean the Contract Documents, the term "contractor" and "general contractor" shall mean the Contractor, the term "contract amount", "contract sum" and "contract price" all mean the same and shall mean Contract Amount, Contract Sum or Contract Price as used in the Contract Documents, the term "Commissioner", "Commissioner of Labor and Industries" and "Department of Labor and Industries" shall mean said Commissioner and said Department and their successors from time to time including the Massachusetts Attorney General's Office as successor thereto pursuant to Chapter 110 of the Massachusetts Acts of 1993, the term "subcontractor" shall mean any and all Subcontractors and the term "work" shall mean the Work on the Project.

2. Representations and Certifications of the Contractor. By executing the Contract Documents, the Contractor represents and certifies that:

(a) The Contractor has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Work.

(b) The Contractor either (i) is not a foreign corporation pursuant to Chapter 30, Section 39L of the Massachusetts General Laws/or (ii) is a foreign corporation in compliance with Massachusetts General Laws Chapter 30, Section 39L and Chapter 181, Sections 3 and 5 and shall maintain such compliance throughout Work on the Project.

(c) The Contractor is a qualified contractor, has complied with the bidding process for the Work, has complied with the provisions of Chapter 30, Section 39M of the Massachusetts General Law, and is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in connection with the Work.

(d) The Contractor has filed a statement of management on internal accounting controls in compliance with Chapter 30, Section 39R(8)(b)(4) of the Massachusetts General Laws.

3. Compliance with Tax Laws. By executing the Contract Documents, the Contractor certifies under the pains and penalties of perjury pursuant to Chapter 62C, Section 49A(b) of the Massachusetts General Laws that the Contractor has complied with all of the laws of the Commonwealth of Massachusetts relating to taxes.

4. Compliance with Accounting and Record Keeping Requirements. The Contractor will comply with all accounting and record keeping requirements of Chapter 30, Section 39R of the Massachusetts General Laws.

5. Contract Administration.

5.1. "Or Equal" Clause. In accordance with Massachusetts General Laws Chapter 30, Section 39M:

Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the word "or approved equal" shall be understood to follow other than with respect to those items designated as proprietary in the specifications (essentially the treatment equipment) which may not have "or equal" substitutions made for such items. An item shall be considered equal to the item so named or described if, in the opinion of the awarding authority:

(a) it is at least equal in quality, durability, appearance, strength and design;

(b) it performs at least equally the function imposed by the general design for the Work; and

(c) it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the Specifications.

Any structural or mechanical changes made necessary to accommodate substituted equipment under this paragraph shall be at the expense of the Contractor or Subcontractor responsible for the work item. See other paragraphs of General and Supplementary Conditions for procedures to be used in determining compliance with the standards of this paragraph.

5.2. Interruptions and Delays. In accordance with Massachusetts General Laws Chapter 30, Section 39O:

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

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

In the event a suspension, delay, interruption, or failure to act of the awarding authority increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the Contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the Contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify, or alter any other rights which the Contractor or the Subcontractor may have against each other.

Except as otherwise provided by law and by this Section 5.2, the Contractor shall not be entitled to damages on account of any hindrances or delays, avoidable or unavoidable; but if such delay be occasioned by the awarding authority, the Contractor may be entitled to an extension of time only, in which to complete the work, to be determined by the Engineer.

5.3. Deviations. In accordance with Massachusetts General Laws Chapter 30, Section 39I:

The Contractor shall perform all the work required by this contract in conformity with the plans and specifications contained herein. No willful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the Engineer or Engineer in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by this contract such deviation from the plans or specifications may be authorized by a written order of the awarding authority or the Engineer or Engineer so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other

nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is of the same costs and quality, or that an equitable adjustment has been agreed upon between the awarding authority and the Contractor and the amount in dollars of said adjustment, and (4) that the deviation is in the best interest of the awarding authority.

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

5.4. Finality of Decisions by Awarding Authority or Engineer. In accordance with Massachusetts General Laws Chapter 30, Section 39J:

Notwithstanding any contrary provision of this contract, no decision by the awarding authority or the Engineer on a dispute, whether of fact or of law, arising under this contract shall be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

5.5. Differing Site Conditions. In accordance with Massachusetts General Laws Chapter 30, Section 39N:

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

The Owner may adopt reasonable rules or regulations in conformity with this Section 5.5 concerning the filing, investigation and settlement of such claims and has done so as provided in Section 4.03 of the General Conditions and the Supplementary General Conditions.

5.6. Interpretations by Awarding Authority. In accordance with Massachusetts General Laws Chapter 30, Section 39P:

In every case in which this contract requires the awarding authority, any official or the Engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, the decision shall be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, any official or the Engineer

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

6. Appropriations and Payments.

6.1. Certificate of Appropriation. In accordance with Massachusetts General Laws Chapter 44, Section 31C:

This contract shall not be deemed to have been made until the auditor or accountant or other officer of the awarding authority having similar duties has certified thereon that an appropriation in the amount of this contract is available therefor and that an officer or agent of the awarding authority has been authorized to execute said contract and approve all requisitions and change orders. No order to the Contractor for a change in or addition to the Work, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the Contractor is willing to perform without any increase in the contract price, shall be deemed to be given until the auditor or accountant, or other officer of the awarding authority having similar duties, has certified thereon that an appropriation in the amount of such order is available therefor; but such certificate shall not be construed as an admission by the awarding authority of its liability to pay for such work. The certificate of the auditor or accountant or other officer of the awarding authority having similar duties, that an appropriation in the amount of this contract or order is available shall bar any defense by the awarding authority on the grounds of insufficient appropriation; and any law barring payment in excess of appropriations shall not apply to amounts covered by any certificate under this Section 6.1.

6.2. Direct Payment. In accordance with Massachusetts General Laws Chapter 30, Section 39F:

(a) Forthwith after the Contractor receives payment on account of a periodic estimate, the Contractor shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the Contractor.

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

(c) Each payment made by the awarding authority to the Contractor pursuant to clauses (a) and (b) of this Section 6.3 for the labor performed and the materials furnished by a Subcontractor shall be made to the Contractor for the

account of that Subcontractor; and the awarding authority shall take reasonable steps to compel the Contractor to make each such payment to each such Subcontractor. If the awarding authority has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the Contractor or which is to be included in a payment to the Contractor for payment to the Subcontractor as provided in clauses (a) and (b) of this Section 6.3, the awarding authority shall act upon the demand as provided in this Section 6.3.

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

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the Subcontractor of the balance due under the subcontract, including any amount due for extra labor and materials furnished to the Contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the Contractor in the sworn reply; provided that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by clause (d) of this Section 6.3. The awarding authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this clause (e).

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of clause (e) of this Section 6.3 in an interest-bearing joint account in the names of the Contractor and the Subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the Contractor and the Subcontractor and shall notify the Contractor and the Subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the Contractor and the Subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to clause (f) of this Section 6.3 shall be made out of amounts payable to the Contractor at the time of receipt of a demand for direct payment from a Subcontractor and out of amounts which later become payable to the Contractor and in the order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the awarding authority to the Contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a Contractor amounts which, together with the deposits in interest bearing accounts pursuant to clause (f) of this Section 6.3, are sufficient to satisfy all unpaid balances of demands for direct payment received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the Contractor.

6.3. Substantial Completion. In accordance with Massachusetts General Laws Chapter 30, Section 39G:

The Contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the Contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the Contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the Contractor's certification within the twenty-one day period, the Contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

Within sixty-five days after the effective date of a declaration of a substantial completion, the awarding authority shall prepare and forthwith send to the Contractor for acceptance a substantial completion estimate for the quantity and price of the work done and all but one per cent retainage on that work, including the quantity, price and all but one per cent retainage for the undisputed part of each work item and extra work item in dispute but excluding the disputed part

thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payment filed by Subcontractors and not yet paid to Subcontractors or deposited in joint accounts pursuant to section thirty-nine F of Chapter 30, but no contract subject to said section thirty-nine F of Chapter 30 shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by Subcontractors, material suppliers or others.

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

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

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

The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the Contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the date of payment. Within 15 days, 30 days in the case of the commonwealth, after receipt from the Contractor, at the place designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period; the awarding authority shall make a periodic payment to the Contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the Contractor has title or to which a subcontractor has title and has authorized the Contractor to transfer title to the awarding authority, upon certification by the Contractor that he is the lawful owner and that the materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the awarding authority may deduct from its payment a retention based on its estimate of the fair value of its claims against the Contractor, a retention for direct payments to Subcontractors based on demands for same in accordance with the provisions of section thirty-nine F of Chapter 30, and a retention to secure satisfactory performance of the contractual work not exceeding five per cent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded Subcontractors entitled to direct payment under section thirty-nine F of chapter thirty; provided, that a five per cent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

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

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

7. Wages and Employment Practices.

7.1. Preference to Veterans and Citizens In Public Work; Rate of Wages. In accordance with Massachusetts General Laws Chapter 149, Section 26:

(a) In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers by the Contractor and all Subcontractors, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment, who are male veterans as defined in Massachusetts General Laws Chapter 4, Section 7, clause 43, and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the

commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect. Each county, town, authority or district in the construction of public works, or persons contracting or subcontracting for such works, shall give preference to veterans and citizens who are residents of such county, town, authority or district.

(b) The rate per hour of the wages paid to said mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the Commissioner of Labor and Industries as hereinafter provided; provided, that the wages paid to laborers employed on said works shall not be less than those paid to laborers in the municipal service of the town or towns where said works are being constructed; provided, further, that where the same public work is to be constructed in two or more towns, the wages paid to laborers shall not be less than those paid to laborers in the municipal service of the town paying the highest rate; provided, further, that if, in any of the towns where the works are to be constructed, a wage rate or wage rates have been established in certain trades and occupations by collective agreements or understandings in the private construction industry between organized labor and employers, the rate or rates to be paid on said works shall not be less than the rates so established; provided, further, that in towns where no such rate or rates have been so established, the wages paid to mechanics, teamsters, chauffeurs and laborers on public works, shall not be less than the wages paid to the employees in the same trades and occupations by private employers engaged in the construction industry. This section shall also apply to regular employees of the Commonwealth or of a county, town, authority or district, when such employees are employed in the construction, addition to or alteration of public buildings for which special appropriations of more than one thousand dollars are provided. Payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided.

7.2. List of Jobs; Classifications; Determination of Rate of Wages; Schedule. In accordance with Massachusetts General Laws Chapter 149, Section 27:

The Commissioner of Labor and Industries shall prepare, for the use of such public officials or public bodies whose duty it shall be to cause public works to be constructed, a list of the several jobs usually performed on various types of public works upon which mechanics and apprentices, teamsters, chauffeurs and laborers are employed including the transportation of gravel or fill to the site of said public works or the removal of surplus gravel or fill from such site. The Commissioner shall classify said jobs, and he may revise such classifications from time to time, as he may deem advisable. Prior to awarding a contract for the construction of public works, said public official or public body shall submit to the Commissioner a list of the jobs upon which mechanics and apprentices, teamsters, chauffeurs and laborers are to be employed, and shall request the Commissioner to determine the rate of wages to be paid on each job. Said rates shall apply to all persons engaged in transporting gravel or fill to the site of said public works or removing gravel

or fill from such site, regardless of whether such persons are employed by a contractor or subcontractor or are independent contractors or owner-operators. The Commissioner, subject to the provisions of Section 7.1 of this Contract Supplement, shall proceed forthwith to determine the same, and shall furnish said official or public body with a schedule of such rate or rates of wages as soon as said determination shall have been made. In advertising or calling for bids for said works, the awarding official or public body shall incorporate said schedule in the advertisement or call for bids by an appropriate reference thereto, and shall furnish a copy of said schedule, without cost, to any person requesting the same. Said schedule shall be made a part of the contract for said works and shall continue to be the minimum rate or rates of wages for said employees during the life of the contract. Any person engaged in the construction of said works shall cause a legible copy of said schedule to be kept posted in a conspicuous place at the site of said works during the life of the contract. An apprentice performing work on a project subject to this section shall maintain in his possession an apprentice identification card issued pursuant to section 11W of chapter 23. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in Section 7.1 of this Contract Supplement, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction. Note: The awarding authority does not guarantee the accuracy of any schedule of wage rates furnished to the Contractor hereunder, and the Contractor shall be responsible for ascertaining the prevailing wages in the area where the work will be performed.

7.3. Employment Records To Be Kept By Contractor, Subcontractors; Statement Of Compliance. In accordance with Massachusetts General Laws Chapter 149, Section 27B:

Every Contractor, Subcontractor or public body engaged in said public works to which Section 7.2 of this Contract Supplement applies shall keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee, and shall furnish to the Commissioner of labor and Industries, upon his request, a copy of said record, signed by the employer or his authorized agent under the penalties of perjury. For every week in which an apprentice is employed by a Contractor, Subcontractor or public body subject to this Section, a photocopy of the apprentice's apprentice identification card, issued pursuant to section 11W of chapter 23, shall be attached to the records submitted under this Section. Such records shall be open to inspection by any authorized representative of the Department of Labor and Industries at any reasonable time, and as often as may be necessary. Every Contractor and Subcontractor required to keep such a record shall submit a copy of said record to the awarding authority on a weekly basis.

Each such Contractor, Subcontractor or public body shall preserve its payroll records for a period of three years from the date of completion of the contract.

Each such Contractor, Subcontractor or public body shall furnish to the Commissioner of Labor and Industries within fifteen days after completion of its portion of the work a statement, executed by the Contractor, Subcontractor, or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE _____, 20__

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

*That I pay or supervise the payment of the persons employed by

(Contractor, Subcontractor or public body)*

*on the _____
(building or project)*

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

*Signature _____
Title _____*

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the Commissioner of Labor and Industries for such inspection.

7.4. Certain Additional Provisions Relating to Prevailing Wages and Employee Matters.

(a) Attention is called to the Advisory issued by the Office of the Attorney General on April 8, 1994 which provide, among other things, that “(t)he revised statute requires every contractor or subcontractor on public works projects to submit a certified payroll to the awarding authority every week.” The Advisory further notes that the Secretary of State and the Attorney General have ruled that “certified weekly payrolls are public records and therefore should be made available to parties on request.” The Contractor shall comply with these requirements.

(b) The Contractor and all Subcontractors (excluding any Subcontractors under procurement contracts with the Owner assigned to the Contractor to the extent such procurement contracts so provide) shall maintain and

participate in a bona fide apprenticeship training program as defined by M.G.L. Chapter 23, Section 11H and 11I for each apprenticeship trade or occupation represented in his or her work force that is approved by the Division of Apprentice Training of the Department of Labor and Industries and must abide by the apprentice to journeyman ratio for each trade prescribed therein the performance of the Contract Documents.

(c) The Contract and all Subcontractors (excluding any Subcontractors under procurement contracts with the Owner assigned to the Contractor to the extent such procurement contracts so provide) must furnish and maintain, at its or their expense, hospitalization and medical benefits for all their employees employed on the project and/or coverage at least comparable to the hospitalization and/or medical benefits provided by the health and welfare plans in the applicable craft recognized by M.G.L. Chapter 149 Section 26 in establishing minimum wage rates Payment in lieu of hospitalization and medical benefits shall not be permitted on this contract. The Contractor and Subcontractor regardless of tier shall furnish the Owner with evidence of hospitalization and medical benefits being furnished to their employees.

(d) The Contractor and all Subcontractors excluding any Subcontractors under procurement contracts with the Owner assigned to the Contractor to the extent such procurement contracts so provide) must properly classify employees as employees rather than independent contractors and treat them accordingly for purposes of workers' compensation insurance coverage, unemployment taxes, social security taxes and income tax withholding in accordance with M.G.L. Chapter 149, Section 148B.

7.5. Wages Paid to Operators of Trucks and Other Equipment. In accordance with Massachusetts General Laws Chapter 149, Section 27F:

Prescribed rates of wages, as determined by the Commissioner of Labor and Industries, shall be paid to the operators of all trucks, vehicles or equipment employed on the Project. Said rates of wages shall be requested of said Commissioner by the awarding authority and shall be furnished by the Commissioner in a schedule containing the classifications of jobs, and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said operators.

7.6. Reserve Police Officers. In accordance with Massachusetts General Laws Chapter 149, Section 34B:

The Contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wage paid to regular police officers in such city or town.

7.7. Eight-Hour Day, etc. In accordance with Massachusetts General Laws Chapter 149, Sections 30 and 34:

No laborer, worker, mechanic, foreman or inspector working within this Commonwealth in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency.

7.8. Lodging, etc. In accordance with Massachusetts General Laws Chapter 149, Section 25:

Every employee under this contract shall lodge, board and trade where and with whom he elects, and neither the Contractor, any Subcontractor nor their respective agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person. This Section 7.7 shall be made a part of all contracts for such employment.

7.9. Worker's Compensation Insurance. In accordance with Massachusetts General Laws Chapter 149, Section 34A.

The Contractor shall, before commencing performance of this contract, provide by insurance for the payment of compensation and the furnishing of other benefits under Massachusetts General Laws Chapter 152 to all persons to be employed under this contract, and the Contractor shall continue such insurance in full force and effect during the term of this contract. Sufficient proof of compliance with this Section 7.8 must be furnished at the time of execution of this contract. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the awarding authority at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Such notice shall be provided in accordance with the provisions of Massachusetts General Laws Chapter 149, Section 34A.

8. Miscellaneous.

8.1. Shoring. In accordance with Massachusetts General Laws Chapter 149, Section 129A:

On any construction project carried on by any city, town, county, or other subdivision of the Commonwealth in which a trench is to be dug to a depth of five feet or more, except for trenches for laying of water pipes dug to a depth of six and one-half feet which will be open less than 48 hours, and except for digging of graves, trenches shall be shored and braced in conformity with the rules and regulations for the prevention of accidents in construction operations, as adopted and enforced by the Attorney General.

8.2. Bonding. The Contractor shall provide all bonds required by Massachusetts General Laws Chapter 149, Section 29 and 44E including a performance bond and a labor and materials payment bond for work on the Project all of which shall be in form and substance and issued by a surety satisfactory to the awarding authority.

EXHIBIT F

PERMITS



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 SE76-2604
 MassDEP File #

eDEP Transaction #
 Wareham
 City/Town

Wareham Wetland Protective Bylaw, Div VI

A. General Information

Please note:
 this form has
 been modified
 with added
 space to
 accommodate
 the Registry
 of Deeds
 Requirements

Important:
 When filling
 out forms on
 the
 computer,
 use only the
 tab key to
 move your
 cursor - do
 not use the
 return key.



1. From: Wareham
 Conservation Commission

2. This issuance is for
 (check one): a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:
Guy Campinha
 a. First Name b. Last Name

Wareham WPCF
 c. Organization

6 Tony's Lane
 d. Mailing Address

Wareham MA 02571
 e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):
 a. First Name b. Last Name

c. Organization

d. Mailing Address

e. City/Town f. State g. Zip Code

5. Project Location:
Old Salt Works Road Wareham
 a. Street Address b. City/Town

Within road layout Within road layout
 c. Assessor's Map/Plat Number d. Parcel/Lot Number

Latitude and Longitude, if known: 41d45'm25.98"Ns 70d37'm49.72"Ws
 d. Latitude e. Longitude



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 SE76-2604
 MassDEP File #

eDEP Transaction #
 Wareham
 City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
 Plymouth
- | | |
|-----------|--|
| a. County | b. Certificate Number (if registered land) |
| N/A | N/A |
| c. Book | d. Page |
7. Dates: May 21, 2020 June 3, 2020 June 22, 2020
 a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance
8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):
 Town of Wareham Generator Replacement - Old Salt Works Pump Station - Site Plan
- | | |
|------------------------|--------------------------|
| a. Plan Title | |
| GHD, Inc. | Sandra L. Tripp |
| b. Prepared By | c. Signed and Stamped by |
| April 16, 2020 | 1"=10' |
| d. Final Revision Date | e. Scale |
- | | |
|--------------------------------------|---------|
| f. Additional Plan or Document Title | g. Date |
|--------------------------------------|---------|

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

- | | | |
|---|--|--|
| a. <input type="checkbox"/> Public Water Supply | b. <input type="checkbox"/> Land Containing Shellfish | c. <input checked="" type="checkbox"/> Prevention of Pollution |
| d. <input type="checkbox"/> Private Water Supply | e. <input type="checkbox"/> Fisheries | f. <input type="checkbox"/> Protection of Wildlife Habitat |
| g. <input checked="" type="checkbox"/> Groundwater Supply | h. <input checked="" type="checkbox"/> Storm Damage Prevention | i. <input checked="" type="checkbox"/> Flood Control |

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 SE76-2604
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 City/Town

B. Findings (cont.)

Denied because:

- b. the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**
- c. the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**
- 3. Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) _____ a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input type="checkbox"/> Bank	_____ a. linear feet	_____ b. linear feet	_____ c. linear feet	_____ d. linear feet
5. <input type="checkbox"/> Bordering Vegetated Wetland	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
6. <input type="checkbox"/> Land Under Waterbodies and Waterways	_____ a. square feet _____ e. c/y dredged	_____ b. square feet _____ f. c/y dredged	_____ c. square feet	_____ d. square feet
7. <input type="checkbox"/> Bordering Land Subject to Flooding	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
Cubic Feet Flood Storage	_____ e. cubic feet	_____ f. cubic feet	_____ g. cubic feet	_____ h. cubic feet
8. <input type="checkbox"/> Isolated Land Subject to Flooding	_____ a. square feet	_____ b. square feet		
Cubic Feet Flood Storage	_____ c. cubic feet	_____ d. cubic feet	_____ e. cubic feet	_____ f. cubic feet
9. <input type="checkbox"/> Riverfront Area	_____ a. total sq. feet	_____ b. total sq. feet		
Sq ft within 100 ft	_____ c. square feet	_____ d. square feet	_____ e. square feet	_____ f. square feet
Sq ft between 100-200 ft	_____ g. square feet	_____ h. square feet	_____ i. square feet	_____ j. square feet



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B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. <input type="checkbox"/> Land Under the Ocean	<u> </u> a. square feet	<u> </u> b. square feet		
	<u> </u> c. c/y dredged	<u> </u> d. c/y dredged		
12. <input type="checkbox"/> Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input type="checkbox"/> Coastal Beaches	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. nourishment cu yd	<u> </u> d. nourishment cu yd
14. <input type="checkbox"/> Coastal Dunes	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. nourishment cu yd	<u> </u> d. nourishment cu yd
15. <input checked="" type="checkbox"/> Coastal Banks	<u>40</u> a. linear feet	<u>40</u> b. linear feet		
16. <input type="checkbox"/> Rocky Intertidal Shores	<u> </u> a. square feet	<u> </u> b. square feet		
17. <input type="checkbox"/> Salt Marshes	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. square feet	<u> </u> d. square feet
18. <input type="checkbox"/> Land Under Salt Ponds	<u> </u> a. square feet	<u> </u> b. square feet		
	<u> </u> c. c/y dredged	<u> </u> d. c/y dredged		
19. <input type="checkbox"/> Land Containing Shellfish	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. square feet	<u> </u> d. square feet
20. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	<u> </u> a. c/y dredged	<u> </u> b. c/y dredged		
21. <input checked="" type="checkbox"/> Land Subject to Coastal Storm Flowage	<u>200</u> a. square feet	<u>200</u> b. square feet		



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B. Findings (cont.)

* #22, if the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

22. Restoration/Enhancement *:

a. square feet of BVW

b. square feet of salt marsh

23. Stream Crossing(s):

a. number of new stream crossings

b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
 - a. The work is a maintenance dredging project as provided for in the Act; or
 - b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
 - c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.



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C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.
10. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]
"File Number SE76-2604 "
11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.
12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
13. The work shall conform to the plans and special conditions referenced in this order.
14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

SPECIAL CONDITIONS

1. The Wareham Conservation Commission is to be notified in writing not less than three (3) working days prior to the start of construction. At the time of notification, all pre-construction conditions shall have been complied with, including General Conditions 8 & 9.
2. Members, agents, and representatives of the Wareham Conservation Commission and/or the D.E.P. shall have the right to enter and inspect the property to insure compliance with the Conditions contained in this Order, and may require the submittal of any data necessary for such evaluation.
3. It is the responsibility of the applicant to see that construction personnel are aware of and adhere to all Conditions contained in this Order. A copy of this Order of Conditions shall be kept available on-site during all phases of the project.
4. Construction may proceed according to the plans submitted to the Commission and D.E.P. For any proposed change to the plans submitted, the applicant shall file a new Notice of Intent, or shall inquire, in writing from the Commission, as to whether the change is significant enough to warrant a new Notice. **Failure to construct the project according to the approved site plan may result in the issuance of an Enforcement Order and/or fines of up to \$300.00/day that the unauthorized deviations continue to exist. This shall be a continuing condition.**
5. Prior to the commencement of any earth moving activity, a haybale barrier shall be placed between the limits of the work and the B.V.W. The haybales shall be firmly anchored with stakes end-to-end. The haybales shall be inspected daily and those showing signs of deterioration shall be replaced immediately. The haybale barrier shall remain in proper functioning condition until all disturbed areas have been stabilized.
6. Any construction in the flood plain shall conform to 780 CMR Section 2102.0, requirements for flood resistant construction.
7. All final earth grading shall be permanently stabilized by the application of loam and seed or sod, except for the designated replication area and any designed paved area (driveway, sidewalk).
8. All debris, fill, and excavated material, shall be stockpiled far enough away from designated resource areas, and at a location to prevent sediment from surface runoff entering wetlands. At no time shall any debris or other material be stockpiled, buried, or disposed of within wetland resource areas, other than that fill which is allowed by this Order and is shown on the above referenced plans.



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WPA Form 5 – Order of Conditions

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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

Please indicate the number of members who will sign this form.

This Order must be signed by a majority of the Conservation Commission.

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

June 22, 2020

1. Date of Issuance

4

2. Number of Signers

Signatures:

[Handwritten signatures]

[Handwritten signature]

by hand delivery on

by certified mail, return receipt requested, on

7020 0640 0000 6877 6522

Date

Date June 22, 2020

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.



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G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location

MassDEP File Number

Has been recorded at the Registry of Deeds of:

County

Book

Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book

Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

**Request for Departmental Action Fee
Transmittal Form**

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

B. Instructions (cont.)

Send this form and check or money order, payable to the *Commonwealth of Massachusetts*, to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.
3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see <http://www.mass.gov/eea/agencies/massdep/about/contacts/>).
4. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
 13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

► See Supplementary Conditions.

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60°F and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. *Day:*
 1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
 1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).
- E. *Furnish, Install, Perform, Provide:*
 1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

2.02 *Copies of Documents*

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

2.03 *► Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *► Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 2. a preliminary Schedule of Submittals; and

► See Supplementary Conditions.

► See Supplementary Conditions.

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

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective

Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any 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 Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

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

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

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

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 ► *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

4.03 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

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

C. *Possible Price and Times Adjustments:*

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

► See Supplementary Conditions.

- a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
- a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

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

- 1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
- 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

- 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly

review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

4.05 *Reference Points*

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

4.06 *► Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm

► See Supplementary Conditions.

such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

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

- B. ► All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor’s liability under the indemnities granted to Owner in the Contract Documents.

5.04 ► *Contractor’s Insurance*

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

► See Supplementary Conditions.

► See Supplementary Conditions.

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. ► The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

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

5.06 ► *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" 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, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

► See Supplementary Conditions.

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

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

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

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

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

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 ► *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and

► See Supplementary Conditions.

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

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

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

- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

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

6.08 *▶ Permits*

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

▶ See Supplementary Conditions.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 ► *Taxes*

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

6.11 *Use of Site and Other Areas*

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

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
 - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 - 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

► See Supplementary Conditions.

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *► Emergencies*

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

6.17 *► Shop Drawings and Samples*

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

1. *Shop Drawings:*

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

2. *Samples:*

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

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

► See Supplementary Conditions.

C. *Submittal Procedures:*

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

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 6.20.A shall not be limited in any way by any limitation on the amount or type of damages,

compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, 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.

6.21 *► Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable

► See Supplementary Conditions.

opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 ► *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

► See Supplementary Conditions.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *► Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

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

► See Supplementary Conditions.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

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

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *► Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

► See Supplementary Conditions.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

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

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times),

the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 **►** *Cost of the Work*

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

► See Supplementary Conditions.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner.

No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

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

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

11.02 Allowances

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

B. *Cash Allowances:*

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

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

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 ▶ *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 ▶ *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

▶ See Supplementary Conditions.

▶ See Supplementary Conditions.

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

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

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both.

Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – ► TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

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

13.02 Access to Work

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

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- C. ► If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

► See Supplementary Conditions.

► See Supplementary Conditions.

- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to

perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 ▶ *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 ▶ *Progress Payment*

A. ▶ *Applications for Payments:*

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

▶ See Supplementary Conditions.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. ► Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

► See Supplementary Conditions.

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

C. ► *Payment Becomes Due:*

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

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 ► *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. ► *Payment Becomes Due:*

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

14.08 ► *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and

► See Supplementary Conditions.

► See Supplementary Conditions.

recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.

- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this

Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 ► *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 ► *Giving Notice*

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective

► See Supplementary Conditions.

► See Supplementary Conditions.

as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700, 2007 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 will 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.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01 *Defined Terms*

SC-1.01 Modify existing definitions as follows:

3. Replace the phrase "acceptable to Engineer" in Paragraph 1.01.A.3 of the General Conditions with the phrase "furnished by the Engineer"

SC-1.02 Terminology

SC-1.02.F Add the following at the end of 1.02.F of the General Conditions:

"SC-1.02.G. Bid Item Description - A separate description of each Bid Item listed in the Bid form. Bid Item Descriptions are included in Division 1 of the Specifications."

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.02 *Copies of Documents*

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

- A. Owner shall furnish to Contractor up to 4 printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

SC-2.03 Commencement of Contract Times; Notice to Proceed

SC-2.04 Before Starting Construction

SC-2.05. Amend the first sentence of paragraph 2.05.A of the General Conditions by striking out the following words "Within ten days after the Effective Date of the Agreement," and inserting the following words "Within ten days after the date indicated in the Notice to Proceed"; and as so amended, paragraph 2.05.A remains in effect.

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SUPPLEMENTARY CONDITIONS

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01 *Intent*

SC-3.01 Add the following new paragraph immediately after Paragraph 3.01.C:

- D. Contractor Documents are written in the imperative mood. When direction is given, it shall be understood that the direction is given to Contractor. For example, the phrase "Provide two pumps" shall be understood to mean "Contractor shall provide two pumps."

SC-3.03 *Reporting and Resolving Discrepancies*

SC-3.03 Add the following new paragraph immediately after Paragraph 3.03.B.1.b:

2. In determining Contract Price with respect to a conflict, error, or discrepancy within the Contract Documents, the Contract Documents shall be given precedence in the following order with Change Orders being the highest precedence:
 1. Laws and Regulations
 2. Change Orders
 3. Work Change Directives
 4. Field Orders
 5. Agreement
 6. Addenda
 7. Supplementary Conditions
 8. General Conditions
 9. Drawings
 10. Specifications
 11. Owner's Standard Details
 12. Bid Form

SC-3.06 *Electronic Data*

SC-3.06 Add the following language immediately after the last sentence of Paragraph 3.06.A:

Contractor, Owner, and Engineer may rely upon the following electronic documents:

- None.

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

SC-4.02 Subsurface and Physical Conditions

SC-4.02 Add the following new paragraph(s) immediately after paragraph 4.02.B of the General Conditions:

- "C. In the preparation of Drawings and Specifications, ENGINEER relied upon the following reports of explorations and tests of subsurface conditions at the Site:

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1. The locations of all existing conditions are approximate and are based on the Town of Wareham Assessors Maps, Record Drawings, and GIS Data. All of the information on such drawings constitutes technical data upon which the CONTRACTOR may rely.
 2. Drawings referenced include the following:
 - a. New Sewage Works Contract No. 89-1 Pine Tree Estates.
- D. Copies of reports and drawings itemized in SC-4.02.C that are not included with Bidding Documents may be examined at the Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, MA and GHD Inc., 1545 Lyannough Road, Route 132, Hyannis, MA 02601 during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which CONTRACTOR may rely as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and ENGINEER's Consultants in the preparation of Drawings and Specifications."

SC-4.06 Delete paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

- "A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to OWNER.
- B. Not used."

ARTICLE 5 - BONDS AND INSURANCE

SC-5.01 Performance, Payment and Other Bonds

SC-5.01.B. Add the following language at the end of paragraph 5.01.B of the General Conditions:

"CONTRACTOR and surety shall jointly complete and execute the Performance and Payment Bond forms included at the end of the Agreement."

SC-5.04 CONTRACTOR's Liability Insurance

SC-5.04 Add the following new paragraph immediately after paragraph 5.04.B of the General Conditions:

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

1. Workers' Compensation, and related coverages under paragraphs 5.04.A.1 and A.2 of the General Conditions:
 - a. State: Statutory
 - b. Applicable Federal (e.g., Longshoreman's): Statutory
 - c. Employer's Liability: \$1,000,000

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2. CONTRACTOR's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of CONTRACTOR:
 - a. General Aggregate: \$3,000,000
 - b. Products - Completed Operations Aggregate: \$3,000,000
 - c. Personal and Advertising Injury: \$3,000,000
 - d. Each Occurrence (Bodily Injury and Property Damage): \$1,000,000
 - e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
 - f. Excess or Umbrella Liability
 - 1) General Aggregate: \$3,000,000
 - 2) Each Occurrence: \$3,000,000
3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:
 - a. Bodily Injury and Property Damage:

Each Person	\$1,000,000
Each Occurrence	\$3,000,000

SC-5.04.B. Add the following subparagraph immediately after paragraph 5.04.B.1 of the General Conditions:

"SC-5.04.B.1.a. OWNER and ENGINEER are to be listed as additional insureds; no ENGINEER's Consultants are to be so listed."

SC-5.04.B. Add the following subparagraph immediately after paragraph 5.04.B.5 of the General Conditions:

"SC-5.04.B.5.a. The provisions or endorsements necessary to comply with paragraph 5.04.B.5 of the General Conditions shall include the obligation to notify the OWNER and ENGINEER when an aggregate limit of liability required or certified has been reduced by the payment of claim(s)."

SC-5.05 OWNER's Liability Insurance

OWNER does not intend to purchase and maintain OWNER's liability insurance.

SC-5.06 Property Insurance

Add the following paragraph to paragraph 5.06.A of the General Conditions:

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SC-5.06.A. Delete paragraph 5.06.A through E of the General Conditions in its entirety and insert the following in its place:

- “A. CONTRACTOR shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
1. include the interests of OWNER, CONTRACTOR, Sub-contractors, ENGINEER, ENGINEER’s Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured; Owner and Engineer.
 2. be written on an Installation Floater or “all-risk” or open peril or special causes of loss policy form that shall at least include insurance for physical loss and 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, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;
 5. allow for partial utilization of the Work by OWNER;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days’ written notice; and
 8. comply with the requirements of Paragraph 5.06.C of the General Conditions.
- B. CONTRACTOR shall be responsible for any deductible or self-insured retention.
- C. The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph SC-5.06 shall comply with the requirements of paragraph 5.06.C of the General Conditions.”

ARTICLE 6 - CONTRACTOR’S RESPONSIBILITIES

SC-6.02 *Labor; Working Hours*

SC-6.02. Add the following new Paragraphs immediately after Paragraph 6.02.B:

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- C. Normal working hours are defined as 8 a.m. to 4:30 p.m., Monday through Friday, excluding Holidays. The following are considered Holidays during which work at the Site is not allowed:
- New Year's Day
 - Memorial Day
 - Independence Day
 - Labor Day
 - Columbus Day
 - Thanksgiving
 - Day after Thanksgiving
 - Christmas
- D. Should Contractor's working hours extend outside normal working hours, any and all costs for weekend, Holiday, and/or on Site overtime services of Engineer's or Owner's personnel, including but not limited to direct salaries, fringe benefits, overhead and profit, administration and supervision, incurred by Owner, will be the sole obligation of Contractor.

SC-6.05 Substitutes and "Or Equals"

SC-6.05 Add the following subparagraph immediately after Subparagraph 6.05.A.1.b:

- c. Contractor provides a line-by-line comparison of the proposed product to the specified product. Line-by-line comparison shall not only include all specified features, but shall also include all other design and/or manufacturing differences between the proposed product and the specified product. Line-by-line comparison shall show no significant design or manufacturing differences that, in the Engineer's opinion, could result in lesser quality, performance, or reliability of the proposed product compared to the specified product.

SC-6.05.A.2. Add the following subparagraph immediately after subparagraph 6.05.A.2.d of the General Conditions:

- e. If the substitute item requires modifications to the structures, piping, layouts, etc., detailed on the Drawings or described in the Contract Documents, the application shall also include details of proposed modifications necessary to accommodate the substitute item. Such details shall include scaled layouts, dimensions, and other pertinent information to enable Engineer to evaluate the entire application. If the substitute item and proposed modifications are approved, Contractor, at no additional cost to Owner, shall do all work necessary to make such modifications and absorb all costs of any related changes imposed on other contractors. Final details of such modifications shall be prepared and submitted for approval by Contractor in accordance with Specification Section 01300, Submittals.

SC-6.05.A. Add the following paragraph immediately after 6.05.A.2 of the General Conditions:

3. Time Constraints: All applications for use of substitutes or 'or equal' items shall be submitted to Engineer within 45 days of the Effective Date of the Agreement. No applications will be considered thereafter unless Contractor produces satisfactory evidence that the specified item is no longer manufactured or is unavailable for the Project.

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SC-6.05.C. Add the following paragraph at the end of paragraph 6.05.C of the General Conditions:

1. In order to aid Engineer in determining the equality of a proposed 'or equal' or substitute item (when compared to the item actually specified), Contractor shall arrange for the performance of any tests requested by Engineer. The nature, extent, tester and supervisions of such tests including engineering costs, shall be borne by Contractor. Certified test results shall be mailed directly to Engineer for all tests requested.

SC-6.06 *Concerning Subcontractors, Suppliers, and Others*

SC-6.06 Add a new paragraph immediately after Paragraph 6.06.G:

- H. Owner may furnish to any Subcontractor or Supplier, to the extent practical, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.08 Permits

SC-6.08.A. Add the following subparagraphs after paragraph 6.08.A of the General Conditions:

"SC-6.08.A.1. CONTRACTOR shall obtain and pay for all permits in connection with this project. Further information concerning CONTRACTOR's responsibilities and obligations under the permit(s), are set forth in Section 01010 – Summary of Work.

SC-6.10 Taxes

SC-6.10.A. Add the following subparagraph to paragraph 6.10.A of the General Conditions:

"SC-6.10.A.1. OWNER qualifies for Massachusetts Sales Tax Exemption under Chapter 757, Section 6, Legislative Acts of 1967, effective January 1, 1968."

SC-6.12 Record Documents

Add the following paragraph immediately after paragraph 6.12.A of the General Conditions:

"SC-6.12.B. If OWNER utilizes any part of the project in accordance with paragraph GC-14.05, CONTRACTOR shall provide ENGINEER for OWNER, a complete set of record drawings current to the date of OWNER's utilization together with all required operation and maintenance manuals, shop drawings, etc., relating to the part of the project being utilized. CONTRACTOR shall submit said documents prior to OWNER accepting the part of the project to be utilized, and CONTRACTOR will be required to submit an updated set of final record documents upon final completion of the project."

SC-6.16 Emergencies

Add the following paragraph immediately after paragraph 6.16.A of the General Conditions:

"SC-6.16.B. CONTRACTOR shall designate one person to respond to emergencies and act on the CONTRACTOR's behalf during off-work hours at the project site. The person's name, address, and telephone number shall be provided to the OWNER during the preconstruction conference and the designated person shall be on call during off-work hours. Response time shall not exceed one hour after notification is given by OWNER or ENGINEER that an emergency exists at the project site."

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SC-6.17 Shop Drawings and Samples

SC-6.17.C.2 Replace “or specific written certification” with “certifying”.

SC-6.17.D.1 In the first sentence of Paragraph 6.17.D.1, replace “in accordance with the Schedule of Submittals acceptable to Engineer” with “in accordance with Specification Section 01300, Submittals”.

Add the following new paragraphs immediately after paragraph 6.17.E:

“SC-6.17.F. CONTRACTOR shall furnish required submittals (in accordance with Section 01300) with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. ENGINEER will record ENGINEER’S time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and CONTRACTOR shall reimburse OWNER for ENGINEER’s charges for such time.

SC-6.17.G. In the event that CONTRACTOR requests a change of a previously approved item, CONTRACTOR shall reimburse OWNER for ENGINEER’S charges for its review time unless the need for such change is beyond the control of CONTRACTOR.”

ARTICLE 7 - OTHER WORK

SC-7.01 Related Work at Site

Add the following paragraph immediately after paragraph 7.01.C of the General Conditions:

“SC-7.01.D. Related Work at the Site to be performed by others is identified as follows:

1. OWNER does not anticipate letting other direct contracts for related work.
2. OWNER does not anticipate performing any work on the Project with his own employees.
3. OWNER is not aware of any work to be performed at the site by utility owners, except for those precautionary measures taken by utility owners to protect their existing facilities from damage or disruption of service.”

SC-7.02 Coordination

OWNER does not anticipate letting other direct contracts for the Project.

ARTICLE 8 - OWNER’S RESPONSIBILITIES

(No Amendments to General Conditions.)

ARTICLE 9 - ENGINEER’S STATUS DURING CONSTRUCTION

SC-9.03 Project Representative

Add the following paragraphs immediately after paragraph 9.03.A of the General Conditions:

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“SC-9.03.B. The Resident Project Representative (RPR) will be ENGINEER's employee or agent at the Site, will act as directed by and under the supervision of ENGINEER, and will confer with ENGINEER regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with ENGINEER and CONTRACTOR. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of CONTRACTOR. The RPR shall:

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by CONTRACTOR and consult with ENGINEER concerning acceptability.
2. *Conferences and Meetings:* Attend meetings with CONTRACTOR, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
3. *Liaison:*
 - a. Serve as ENGINEER's liaison with CONTRACTOR, working principally through CONTRACTOR's authorized representative, assist in providing information regarding the intent of the Contract Documents.
 - b. Assist ENGINEER in serving as OWNER's liaison with CONTRACTOR when CONTRACTOR's operations affect OWNER's on-Site operations.
 - c. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.
4. *Interpretation of Contract Documents:* Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by ENGINEER.
5. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by CONTRACTOR, and notify ENGINEER of availability of Samples for examination.
6. *Modifications:* Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to ENGINEER. Transmit to CONTRACTOR in writing decisions as issued by ENGINEER.
7. *Review of Work and Rejection of Defective Work:*
 - a. Conduct on-site observations of CONTRACTOR's work in progress to assist ENGINEER in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to ENGINEER whenever RPR believes that any part of CONTRACTOR's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the

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completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise ENGINEER of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. *Inspections, Tests, and System Startups:*
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate OWNER's personnel, and that CONTRACTOR maintains adequate records thereof.
 - b. Observe, record, and report to ENGINEER appropriate details relative to the test procedures and systems start-ups.
9. *Records:*
 - a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all CONTRACTORS, Subcontractors, and major Suppliers of materials and equipment.
 - b. Maintain records for use in preparing Project documentation.
10. *Reports:*
 - a. Furnish to ENGINEER periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to ENGINEER proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from CONTRACTOR.
 - c. Immediately notify ENGINEER of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.
11. *Payment Requests:* Review Applications for Payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to ENGINEER for review and forwarding to OWNER prior to payment for that part of the Work.

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13. *Completion:*

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

SC-9.03.C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of ENGINEER's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, Suppliers, or CONTRACTOR's superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences, or procedures of CONTRACTOR's work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of OWNER or CONTRACTOR.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.
7. Accept Shop Drawing or Sample submittals from anyone other than CONTRACTOR.
8. Authorize OWNER to occupy the Project in whole or in part."

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

(No Amendments to General Conditions.)

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

SC-11.01 Cost of the Work

SC-11.01.A.5.c. Delete paragraph 11.01.A.5.c in its entirety and insert the following in its place:

"c. Construction Equipment and Machinery

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- 1) Rentals of all construction equipment and machinery, and the parts thereof 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.
- 2) Costs for equipment and machinery owned by CONTRACTOR will be paid at a rate shown for such equipment in the Rental Rate Blue Book for Construction Equipment for equipment in Massachusetts. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.”
- 3) There shall be no payment for idle or standby equipment.
- 4) For equipment use periods in excess of 8 hours, costs shall be calculated on the daily rate, for equipment use periods in excess of five (5) days, costs shall be calculated on the weekly rate, and for equipment use periods in excess of 4 weeks, costs shall be calculated at the monthly rate.
- 5) The current values of the Rental Rate Blue Book will be used in establishing equipment rates. The version applicable to specific extra work or force account work will be the version in effect as of the first day of work is performed and that rate shall apply throughout the period the extra work or force account work is being performed.

SC-11.01.D. Add the following language to the end of paragraph 11.01.D of the General Conditions:

“When requested by ENGINEER, CONTRACTOR shall identify sources used to determine rental rates of equipment and submit related evidence to ENGINEER to support such data.”

SC-11.03 Unit Price Work

SC-11.03.C. Delete paragraph 11.03.D of the General Conditions in its entirety and insert the following in its place:

“D. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

1. if the variation in the quantity of a particular item of Unit Price Work performed by the CONTRACTOR differs by more than 10 percent from the estimated quantity of such item indicated in the Agreement and the total cost of that particular item of Unit Price Work amounts to 10 percent or more of the Contract Price; and
2. if there is no corresponding adjustment with respect to any other item of Work; and

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3. if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.
4. Adjusted unit prices, if any, shall be applied as follows:
 - a. Quantity Overruns: Applied only to the difference between the total quantity of completed Work and the calculated quantity of Work at the variation limit for a particular item of Unit Price Work.
 - b. Quantity Underruns: The difference between the adjusted unit price and the original unit price (stated in the Agreement) shall be applied to the total quantity of completed Work for a particular item of Unit Price Work.

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

SC-12.01 Change of Contract Price

SC-12.01.C.2. Add the following subparagraph immediately after subparagraph (f):

- “(g) When only a credit is involved in any one change, the amount of the credit to be allowed by CONTRACTOR to OWNER will be the amount of decrease in cost plus a deduction in the CONTRACTOR’s fee by an amount equal to five percent of such decrease in cost.”

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

SC-13.03 Tests and Inspections

SC-13.03.C. Add the following language at the end of paragraph 13.03.C of the General Conditions:

“Such inspections, testing, or approvals shall be performed by organizations acceptable to ENGINEER.”

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.01 Schedule of Values

SC-14.02.A. Application for Payment. Add the following language to subparagraph 14.02.A.1 of the General Conditions:

“By signing the Application and Certificate for Payment, the CONTRACTOR certifies that all items, units, quantities, and prices of Work and material in the estimate are correct, that all Work has been performed and materials supplied in full accordance with the contract, and that the CONTRACTOR has no claims for damages, losses or expense against the OWNER for compensation in addition to that provided for in the application except such claims for change of contract price as the

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CONTRACTOR has filed with the ENGINEER and OWNER in writing (in accordance with Article 10) prior to the date of his certifying the application.”

SC-14.02.B. Review of Applications. Add the following subparagraph immediately after subparagraph 14.02.B.5.d of the General Conditions:

- “e. or because of CONTRACTOR’s failure to submit certifications, affidavits, schedules, or other written information when and as required in the Contract Documents, or CONTRACTOR’s failure to submit shop drawings in accordance with the shop drawing schedule.”

SC-14.02.C. Payment Becomes Due

SC-14.02.C.1. Replace the phrase “Ten days,” which begins the first sentence of subparagraph 14.02.C.1 in the General Conditions, with the phrase “Fourteen days.”

SC-14.05 Partial Utilization

SC-14.05.A. Add the following subparagraph immediately after paragraph 14.05.A.2 of the General Conditions:

- “3. Identification and extent of that part of the Work which OWNER requires to be substantially complete prior to completion of all of the Work, if any, is set forth in the General Requirements.”

SC-14.07 Final Payment

SC-14.07.A. Add the following subparagraph immediately after paragraph 14.07.A.3 of the General Conditions:

- “4. The application shall be made on forms provided by the ENGINEER. By signing the application and certificate for payment, the CONTRACTOR certifies that the total cost of the Work and the amount due the CONTRACTOR for payment is full compensation for all Work done under the terms of the contract in its original form; that the payment is full compensation for all Work ordered to be done under Change Orders; and that the payment is full compensation for all other Work done by the CONTRACTOR and for all damages, losses, and expense incurred by the CONTRACTOR for doing and furnishing everything relating to or arising out of the Work, and that the CONTRACTOR waives all right to claim or receive any further compensation in addition to that provided for in the Final Payment except as provided in paragraph 14.09.”

SC-14.08 Final Completion Delayed

SC-14.08.A. The establishing of the ‘Final Settlement’ in paragraph SC-14.07.C.1 and its subsequent release, as specified in paragraph SC-14.08.B, shall act to supersede the last two sentences of paragraph 14.08.A of the General Conditions.

SC-14.08.B. Release of Final Settlement

- 1. The amounts retained to assure final completion of the Work will be released to CONTRACTOR in the following manner:
 - a. Periodic payments will be made by OWNER in amounts which equal the dollar value of the various segments of such Work as they become complete to ENGINEER’s

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satisfaction, except that no payment will be made for an amount which is less than one thousand dollars unless said amount is associated with the final segment of such Work.

- b. Payment for the balance of the retained amount will be made by OWNER when the final segment of such Work is completed to ENGINEER's satisfaction.

Payments will be made by OWNER within thirty (30) days after the date OWNER receives a certification from ENGINEER that particular segments of the Work are satisfactorily completed.

2. The amounts retained to satisfy any claims, liens or judgments against CONTRACTOR will be released to CONTRACTOR if evidence satisfactory to OWNER is promptly furnished that such claims, liens, or judgments were suitably discharged. Any claims, liens, or judgments referred to in these Contract Documents shall pertain to the project and must be filed in accordance with the terms of the applicable contract and/or applicable laws.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

(No Amendments to General Conditions.)

ARTICLE 16 - DISPUTE RESOLUTION

SC-16.01 Methods and Procedures

SC-16.01.A. OWNER and CONTRACTOR have agreed that the method and procedure for resolving disputes between them shall be as set forth in paragraph SC-16.02 paragraphs SC-16.02 and SC-16.03 below.

SC-16.01 Add the following new paragraph immediately after paragraph 16.01 of the General Conditions:

“SC-16.02 Mediation

- A. OWNER and CONTRACTOR agree that they shall submit any and all unsettled Claims or counterclaims, disputes, or other matters in question between them arising out of or relating to the Contract Documents or the breach thereof to mediation prior to either of them initiating against the other a demand for arbitration pursuant to paragraph SC-16.03, unless delay in initiating arbitration would irrevocably prejudice one of the parties. The 30-day time limit within which to file a demand for arbitration as provided in paragraphs SC-16.03.B and 16.03.C shall be suspended with respect to a dispute submitted to mediation within that time limit and shall remain suspended until 10 days after the termination of the mediation. The mediator of any dispute submitted to mediation under this agreement shall not serve as arbitrator of such dispute unless otherwise agreed.”

ARTICLE 17 - MISCELLANEOUS

SC-17.06 Add the following new paragraphs immediately after paragraph 17.06 of the General Conditions:

“SC-17.07 Labor and Legal Requirements

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SC-17.07.A. The CONTRACTOR shall abide by all regulations and laws that relate to labor that may affect the Work of this Contract, including Federal, State, County, Town, City, and Village regulations.

SC-17.07.B. The latest Prevailing Wage Rate Schedules setting forth minimum wages and supplements for this area of the state, together with labor standard provisions and non-discrimination in employment provisions are appended to the Supplementary Conditions.

SC-17.07.C. The CONTRACTOR shall make provision for the disability benefits, unemployment insurance and social security required by law.

SC-17.07.D. The CONTRACTOR shall keep himself fully informed of all laws of the State (in which the Project is located) and of the United States of America, and of all municipal laws and ordinances in any manner affecting the Work of this Contract, and of all orders or decrees of any body or tribunal having any jurisdiction or authority in any manner affecting such Work, and shall be responsible for strict compliance therewith. If any clause of this Contract does not conform to any such law, such clause shall be void insofar as it conflicts with such law, and such law shall be operative in lieu thereof.

SC-17.07.E. Each and every provision of law and clause required by law to be inserted in this Contract should be, is and is deemed to be inserted herein, and if through a mistake or otherwise any such provision is not inserted, or it is not correctly inserted, then upon the application of either party the Contract shall forthwith be amended physically to make such insertion.

SC-17.07.F. If any provision herein shall be as to destroy the mutuality of this Contract or to render it invalid or illegal, then if such provision shall not appear to have been so material that without it the Contract would not have been made by the parties, it shall not be deemed to form part thereof but the balance of the Contract shall remain in full force and effect.”

EXAMPLE OF CHANGE ORDER CALCULATIONS

An example of change order calculation is shown below to demonstrate application of allowable payroll tax percentages, CONTRACTOR's fees, etc. in connection with the requirements of Article 12:

A. Reimbursement to CONTRACTOR for a truck driver and truck rental:

Labor

Basic hourly rate	\$14.10
Health and welfare contribution	\$1.96
Pension fund contribution	<u>+ \$1.71</u>
Chargeable hourly rate	\$17.77
Total for 3 hours	\$ 53.31

Payroll Taxes

FICA	7.51%
Unemployment insurance	6.00%
Workers compensation + PLPD*	<u>24.00%</u>
	37.15% x \$14.10 = \$5.24
Total for 3 hours	\$ 15.71

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<u>Truck Rental @ \$50.00 per hour (for 3 hours)</u>	\$150.00
Total actual labor and materials	\$219.03
CONTRACTOR's Fee (15%)	<u>32.85</u>
Total Cost of Change Order	\$251.88

B. Reimbursement to CONTRACTOR if Same Work is Performed by a Subcontractor:

Total actual labor and materials from above (subcontractor)	\$219.03
Subcontractor's Fee (15%)	<u>32.85</u>
Total Cost of Subcontractor's Work	\$251.88
CONTRACTOR's Fee (5%)	<u>12.59</u>
 Total Cost of Change Order	 \$264.47

*Personnel liability and property damage.

MINIMUM HOURLY WAGE RATES

The CONTRACTOR and every subcontractor shall post in a prominent and accessible place at the site of the Work, a legible copy of the Federal Wage Determination Rate Schedule (if such is included in the Contract Documents).

The rates established by each schedule are minimum, and all employees shall be paid no less than the established rate listed for each trade or occupation. In case of conflict between schedules in any one trade or occupation, the higher rate listed shall control and such higher rate shall be considered to be the minimum.

State: The minimum rates of wages and schedule of supplements to be provided for the various trades shall be in accordance with the Prevailing Wage Rate Schedule which is included herein.

Minimum Wage Rates as determined by the Commissioner of Department of Labor and Industries under the provision of the Massachusetts General Laws, Chapter 149, Sections 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.

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CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

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

Prevailing Wage Rates

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

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: Town of Wareham
Contract Number: 2020-WW-01 **City/Town:** WAREHAM
Description of Work: Salt Works Road & Terry Lane Pump Stations - Removal and replacement of emergency generators at existing pump stations. Installation of FRP decks to elevate generators.
Job Location: Salt Works Road, Terry Lane - Wareham

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 criminal penalties.
-

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.15	\$12.91	\$13.72	\$0.00	\$61.78
	12/01/2020	\$35.15	\$12.91	\$14.82	\$0.00	\$62.88
	06/01/2021	\$35.95	\$12.91	\$14.82	\$0.00	\$63.68
	08/01/2021	\$35.95	\$13.41	\$14.82	\$0.00	\$64.18
	12/01/2021	\$35.95	\$13.41	\$16.01	\$0.00	\$65.37
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.22	\$12.91	\$13.72	\$0.00	\$61.85
	12/01/2020	\$35.22	\$12.91	\$14.82	\$0.00	\$62.95
	06/01/2021	\$36.02	\$12.91	\$14.82	\$0.00	\$63.75
	08/01/2021	\$36.02	\$13.41	\$14.82	\$0.00	\$64.25
	12/01/2021	\$36.02	\$13.41	\$16.01	\$0.00	\$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.34	\$12.91	\$13.72	\$0.00	\$61.97
	12/01/2020	\$35.34	\$12.91	\$14.82	\$0.00	\$63.07
	06/01/2021	\$36.14	\$12.91	\$14.82	\$0.00	\$63.87
	08/01/2021	\$36.14	\$13.41	\$14.82	\$0.00	\$64.37
	12/01/2021	\$36.14	\$13.41	\$16.01	\$0.00	\$65.56
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.81	\$8.60	\$15.77	\$0.00	\$59.18
	12/01/2020	\$35.70	\$8.60	\$15.77	\$0.00	\$60.07
	06/01/2021	\$36.62	\$8.60	\$15.77	\$0.00	\$60.99
	12/01/2021	\$37.53	\$8.60	\$15.77	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)</i>	06/01/2020	\$37.10	\$12.80	\$9.45	\$0.00	\$59.35
	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.81	\$8.60	\$15.77	\$0.00	\$59.18
	12/01/2020	\$35.70	\$8.60	\$15.77	\$0.00	\$60.07
	06/01/2021	\$36.62	\$8.60	\$15.77	\$0.00	\$60.99
	12/01/2021	\$37.53	\$8.60	\$15.77	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2020	\$46.10	\$7.07	\$17.98	\$0.00	\$71.15

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$29.97	\$7.07	\$11.69	\$0.00	\$48.73
2	65	\$29.97	\$7.07	\$11.69	\$0.00	\$48.73
3	70	\$32.27	\$7.07	\$12.59	\$0.00	\$51.93
4	75	\$34.58	\$7.07	\$13.49	\$0.00	\$55.14
5	80	\$36.88	\$7.07	\$14.38	\$0.00	\$58.33
6	85	\$39.19	\$7.07	\$15.29	\$0.00	\$61.55
7	90	\$41.49	\$7.07	\$16.18	\$0.00	\$64.74
8	95	\$43.80	\$7.07	\$17.09	\$0.00	\$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) <i>BRICKLAYERS LOCAL 3 (NEW BEDFORD)</i>	08/01/2020	\$55.75	\$10.75	\$22.09	\$0.00	\$88.59
	02/01/2021	\$56.39	\$10.75	\$22.09	\$0.00	\$89.23
	08/01/2021	\$57.79	\$10.75	\$22.25	\$0.00	\$90.79
	02/01/2022	\$58.38	\$10.75	\$22.25	\$0.00	\$91.38

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 New Bedford

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.88	\$10.75	\$22.09	\$0.00	\$60.72
2	60	\$33.45	\$10.75	\$22.09	\$0.00	\$66.29
3	70	\$39.03	\$10.75	\$22.09	\$0.00	\$71.87
4	80	\$44.60	\$10.75	\$22.09	\$0.00	\$77.44
5	90	\$50.18	\$10.75	\$22.09	\$0.00	\$83.02

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.20	\$10.75	\$22.09	\$0.00	\$61.04
2	60	\$33.83	\$10.75	\$22.09	\$0.00	\$66.67
3	70	\$39.47	\$10.75	\$22.09	\$0.00	\$72.31
4	80	\$45.11	\$10.75	\$22.09	\$0.00	\$77.95
5	90	\$50.75	\$10.75	\$22.09	\$0.00	\$83.59

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2020	\$40.30	\$8.60	\$17.24	\$0.00	\$66.14
	12/01/2020	\$41.28	\$8.60	\$17.24	\$0.00	\$67.12
	06/01/2021	\$42.30	\$8.60	\$17.24	\$0.00	\$68.14
	12/01/2021	\$43.31	\$8.60	\$17.24	\$0.00	\$69.15

For apprentice rates see "Apprentice- LABORER"

CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2020	\$39.15	\$8.60	\$17.24	\$0.00	\$64.99
	12/01/2020	\$40.13	\$8.60	\$17.24	\$0.00	\$65.97
	06/01/2021	\$41.15	\$8.60	\$17.24	\$0.00	\$66.99
	12/01/2021	\$42.16	\$8.60	\$17.24	\$0.00	\$68.00

For apprentice rates see "Apprentice- LABORER"

CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2020	\$39.15	\$8.60	\$17.24	\$0.00	\$64.99
	12/01/2020	\$40.13	\$8.60	\$17.24	\$0.00	\$65.97
	06/01/2021	\$41.15	\$8.60	\$17.24	\$0.00	\$66.99
	12/01/2021	\$42.16	\$8.60	\$17.24	\$0.00	\$68.00

For apprentice rates see "Apprentice- LABORER"

CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	09/01/2020	\$42.94	\$9.40	\$18.95	\$0.00	\$71.29
	03/01/2021	\$43.54	\$9.40	\$18.95	\$0.00	\$71.89
	09/01/2021	\$44.19	\$9.40	\$18.95	\$0.00	\$72.54
	03/01/2022	\$44.79	\$9.40	\$18.95	\$0.00	\$73.14
	09/01/2022	\$45.44	\$9.40	\$18.95	\$0.00	\$73.79
	03/01/2023	\$46.04	\$9.40	\$18.95	\$0.00	\$74.39

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.47	\$9.40	\$1.73	\$0.00	\$32.60
2	60	\$25.76	\$9.40	\$1.73	\$0.00	\$36.89
3	70	\$30.06	\$9.40	\$13.76	\$0.00	\$53.22
4	75	\$32.21	\$9.40	\$13.76	\$0.00	\$55.37
5	80	\$34.35	\$9.40	\$15.49	\$0.00	\$59.24
6	80	\$34.35	\$9.40	\$15.49	\$0.00	\$59.24
7	90	\$38.65	\$9.40	\$17.22	\$0.00	\$65.27
8	90	\$38.65	\$9.40	\$17.22	\$0.00	\$65.27

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.77	\$9.40	\$1.73	\$0.00	\$32.90
2	60	\$26.12	\$9.40	\$1.73	\$0.00	\$37.25
3	70	\$30.48	\$9.40	\$13.76	\$0.00	\$53.64
4	75	\$32.66	\$9.40	\$13.76	\$0.00	\$55.82
5	80	\$34.83	\$9.40	\$15.49	\$0.00	\$59.72
6	80	\$34.83	\$9.40	\$15.49	\$0.00	\$59.72
7	90	\$39.19	\$9.40	\$17.22	\$0.00	\$65.81
8	90	\$39.19	\$9.40	\$17.22	\$0.00	\$65.81

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$30.45/ 3&4 \$36.42/ 5&6 \$54.95/ 7&8 \$60.97

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME <i>CARPENTERS-ZONE 3 (Wood Frame)</i>	04/01/2020	\$22.66	\$7.21	\$4.80	\$0.00	\$34.67
	04/01/2021	\$23.16	\$7.21	\$4.80	\$0.00	\$35.17
	04/01/2022	\$23.66	\$7.21	\$4.80	\$0.00	\$35.67
	04/01/2023	\$24.16	\$7.21	\$4.80	\$0.00	\$36.17

All Aspects of New Wood Frame Work

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 04/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$13.60	\$7.21	\$0.00	\$0.00	\$20.81
2	60	\$13.60	\$7.21	\$0.00	\$0.00	\$20.81
3	65	\$14.73	\$7.21	\$0.00	\$0.00	\$21.94
4	70	\$15.86	\$7.21	\$0.00	\$0.00	\$23.07
5	75	\$17.00	\$7.21	\$3.80	\$0.00	\$28.01
6	80	\$18.13	\$7.21	\$3.80	\$0.00	\$29.14
7	85	\$19.26	\$7.21	\$3.80	\$0.00	\$30.27
8	90	\$20.39	\$7.21	\$3.80	\$0.00	\$31.40

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$13.90	\$7.21	\$0.00	\$0.00	\$21.11
2	60	\$13.90	\$7.21	\$0.00	\$0.00	\$21.11
3	65	\$15.05	\$7.21	\$0.00	\$0.00	\$22.26
4	70	\$16.21	\$7.21	\$0.00	\$0.00	\$23.42
5	75	\$17.37	\$7.21	\$3.80	\$0.00	\$28.38
6	80	\$18.53	\$7.21	\$3.80	\$0.00	\$29.54
7	85	\$19.69	\$7.21	\$3.80	\$0.00	\$30.70
8	90	\$20.84	\$7.21	\$3.80	\$0.00	\$31.85

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$17.41/ 3&4 \$19.67/ 5&6 \$26.87/ 7&8 \$29.14

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (NEW BEDFORD)	01/01/2020	\$49.07	\$12.75	\$22.41	\$0.62	\$84.85
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Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$12.75	\$15.41	\$0.00	\$52.70
2	60	\$29.44	\$12.75	\$17.41	\$0.62	\$60.22
3	65	\$31.90	\$12.75	\$18.41	\$0.62	\$63.68
4	70	\$34.35	\$12.75	\$19.41	\$0.62	\$67.13
5	75	\$36.80	\$12.75	\$20.41	\$0.62	\$70.58
6	80	\$39.26	\$12.75	\$21.41	\$0.62	\$74.04
7	90	\$44.16	\$12.75	\$22.41	\$0.62	\$79.94

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 <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$50.33	\$13.00	\$15.70	\$0.00	\$79.03
	12/01/2020	\$51.48	\$13.00	\$15.70	\$0.00	\$80.18
	06/01/2021	\$52.58	\$13.00	\$15.70	\$0.00	\$81.28
	12/01/2021	\$53.73	\$13.00	\$15.70	\$0.00	\$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$32.72	\$13.00	\$15.70	\$0.00	\$61.42
	12/01/2020	\$33.50	\$13.00	\$15.70	\$0.00	\$62.20
	06/01/2021	\$34.25	\$13.00	\$15.70	\$0.00	\$62.95
	12/01/2021	\$35.04	\$13.00	\$15.70	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2020	\$51.51	\$8.25	\$22.40	\$0.00	\$82.16
	01/01/2021	\$52.06	\$8.25	\$22.75	\$0.00	\$83.06

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.76	\$8.25	\$0.00	\$0.00	\$34.01
2	55	\$28.33	\$8.25	\$6.05	\$0.00	\$42.63
3	60	\$30.91	\$8.25	\$6.60	\$0.00	\$45.76
4	65	\$33.48	\$8.25	\$7.15	\$0.00	\$48.88
5	70	\$36.06	\$8.25	\$19.10	\$0.00	\$63.41
6	75	\$38.63	\$8.25	\$19.65	\$0.00	\$66.53
7	80	\$41.21	\$8.25	\$20.20	\$0.00	\$69.66
8	90	\$46.36	\$8.25	\$21.30	\$0.00	\$75.91

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.03	\$8.25	\$0.00	\$0.00	\$34.28
2	55	\$28.63	\$8.25	\$6.16	\$0.00	\$43.04
3	60	\$31.24	\$8.25	\$6.72	\$0.00	\$46.21
4	65	\$33.84	\$8.25	\$7.28	\$0.00	\$49.37
5	70	\$36.44	\$8.25	\$19.39	\$0.00	\$64.08
6	75	\$39.05	\$8.25	\$19.95	\$0.00	\$67.25
7	80	\$41.65	\$8.25	\$20.51	\$0.00	\$70.41
8	90	\$46.85	\$8.25	\$21.63	\$0.00	\$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN <i>LABORERS - ZONE 2</i>	12/01/2019	\$39.30	\$8.10	\$16.60	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2019	\$40.30	\$8.10	\$16.60	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 2</i>	12/01/2019	\$40.05	\$8.10	\$16.60	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	12/01/2019	\$40.30	\$8.10	\$16.60	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2019	\$40.05	\$8.10	\$16.60	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	12/01/2019	\$39.30	\$8.10	\$16.60	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 223

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.46	\$10.90	\$0.52	\$0.00	\$28.88
2	45	\$19.65	\$10.90	\$0.59	\$0.00	\$31.14
3	50	\$21.83	\$10.90	\$0.65	\$0.00	\$33.38
4	55	\$24.01	\$10.90	\$6.28	\$0.00	\$41.19
5	60	\$26.20	\$10.90	\$6.77	\$0.00	\$43.87
6	65	\$28.38	\$10.90	\$7.24	\$0.00	\$46.52
7	70	\$30.56	\$10.90	\$7.73	\$0.00	\$49.19
8	75	\$32.75	\$10.90	\$8.21	\$0.00	\$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2020	\$61.42	\$15.73	\$18.41	\$0.00	\$95.56
	01/01/2021	\$63.47	\$15.88	\$19.31	\$0.00	\$98.66
	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86

Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.71	\$15.73	\$0.00	\$0.00	\$46.44
2	55	\$33.78	\$15.73	\$18.41	\$0.00	\$67.92
3	65	\$39.92	\$15.73	\$18.41	\$0.00	\$74.06
4	70	\$42.99	\$15.73	\$18.41	\$0.00	\$77.13
5	80	\$49.14	\$15.73	\$18.41	\$0.00	\$83.28

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.74	\$15.88	\$0.00	\$0.00	\$47.62
2	55	\$34.91	\$15.88	\$19.31	\$0.00	\$70.10
3	65	\$41.26	\$15.88	\$19.31	\$0.00	\$76.45
4	70	\$44.43	\$15.88	\$19.31	\$0.00	\$79.62
5	80	\$50.78	\$15.88	\$19.31	\$0.00	\$85.97

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	01/01/2020	\$42.99	\$15.73	\$18.41	\$0.00	\$77.13
	01/01/2021	\$44.43	\$15.88	\$19.31	\$0.00	\$79.62
	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FENCE & GUARD RAIL ERECTOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2020	\$44.73	\$12.50	\$15.70	\$0.00	\$72.93
	11/01/2020	\$45.73	\$12.50	\$15.70	\$0.00	\$73.93
	05/01/2021	\$46.88	\$12.50	\$15.70	\$0.00	\$75.08
	11/01/2021	\$47.88	\$12.50	\$15.70	\$0.00	\$76.08
	05/01/2022	\$49.03	\$12.50	\$15.70	\$0.00	\$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2020	\$46.23	\$12.50	\$15.70	\$0.00	\$74.43
	11/01/2020	\$47.24	\$12.50	\$15.70	\$0.00	\$75.44
	05/01/2021	\$48.40	\$12.50	\$15.70	\$0.00	\$76.60
	11/01/2021	\$49.41	\$12.50	\$15.70	\$0.00	\$77.61
	05/01/2022	\$50.57	\$12.50	\$15.70	\$0.00	\$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2020	\$22.64	\$12.50	\$15.70	\$0.00	\$50.84
	11/01/2020	\$23.23	\$12.50	\$15.70	\$0.00	\$51.43
	05/01/2021	\$23.91	\$12.50	\$15.70	\$0.00	\$52.11
	11/01/2021	\$24.51	\$12.50	\$15.70	\$0.00	\$52.71
	05/01/2022	\$25.18	\$12.50	\$15.70	\$0.00	\$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE <i>/ COMMISSIONING ELECTRICIANS LOCAL 223</i>	09/01/2020	\$36.86	\$10.90	\$12.45	\$0.00	\$60.21
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$40.30	\$13.00	\$15.70	\$0.00	\$69.00
	12/01/2020	\$41.25	\$13.00	\$15.70	\$0.00	\$69.95
	06/01/2021	\$42.16	\$13.00	\$15.70	\$0.00	\$70.86
	12/01/2021	\$43.11	\$13.00	\$15.70	\$0.00	\$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER <i>LABORERS - ZONE 2</i>	06/01/2020	\$23.50	\$8.60	\$15.77	\$0.00	\$47.87
	12/01/2020	\$24.50	\$8.60	\$15.77	\$0.00	\$48.87
	06/01/2021	\$24.50	\$8.60	\$15.77	\$0.00	\$48.87
	12/01/2021	\$24.50	\$8.60	\$15.77	\$0.00	\$48.87
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	09/01/2020	\$47.79	\$9.40	\$19.25	\$0.00	\$76.44
	03/01/2021	\$48.59	\$9.40	\$19.25	\$0.00	\$77.24
	09/01/2021	\$49.39	\$9.40	\$19.25	\$0.00	\$78.04
	03/01/2022	\$50.19	\$9.40	\$19.25	\$0.00	\$78.84

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - FLOORCOVERER - Local 2168 Zone I

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.90	\$9.40	\$1.79	\$0.00	\$35.09
2	55	\$26.28	\$9.40	\$1.79	\$0.00	\$37.47
3	60	\$28.67	\$9.40	\$13.88	\$0.00	\$51.95
4	65	\$31.06	\$9.40	\$13.88	\$0.00	\$54.34
5	70	\$33.45	\$9.40	\$15.67	\$0.00	\$58.52
6	75	\$35.84	\$9.40	\$15.67	\$0.00	\$60.91
7	80	\$38.23	\$9.40	\$17.46	\$0.00	\$65.09
8	85	\$40.62	\$9.40	\$17.46	\$0.00	\$67.48

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.30	\$9.40	\$1.79	\$0.00	\$35.49
2	55	\$26.72	\$9.40	\$1.79	\$0.00	\$37.91
3	60	\$29.15	\$9.40	\$13.88	\$0.00	\$52.43
4	65	\$31.58	\$9.40	\$13.88	\$0.00	\$54.86
5	70	\$34.01	\$9.40	\$15.67	\$0.00	\$59.08
6	75	\$36.44	\$9.40	\$15.67	\$0.00	\$61.51
7	80	\$38.87	\$9.40	\$17.46	\$0.00	\$65.73
8	85	\$41.30	\$9.40	\$17.46	\$0.00	\$68.16

Notes: Steps are 750 hrs.
 % After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$32.70/ 3&4 \$39.20/ 5&6 \$58.52/ 7&8 \$65.09

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$32.72	\$13.00	\$15.70	\$0.00	\$61.42
	12/01/2020	\$33.50	\$13.00	\$15.70	\$0.00	\$62.20
	06/01/2021	\$34.25	\$13.00	\$15.70	\$0.00	\$62.95
	12/01/2021	\$35.04	\$13.00	\$15.70	\$0.00	\$63.74

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 1333</i>	06/01/2020	\$39.18	\$10.80	\$10.45	\$0.00	\$60.43
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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - GLAZIER - Local 1333

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.59	\$10.80	\$1.80	\$0.00	\$32.19
2	56	\$22.04	\$10.80	\$1.80	\$0.00	\$34.64
3	63	\$24.49	\$10.80	\$2.45	\$0.00	\$37.74
4	69	\$26.94	\$10.80	\$2.45	\$0.00	\$40.19
5	75	\$29.39	\$10.80	\$3.15	\$0.00	\$43.34
6	81	\$31.83	\$10.80	\$3.15	\$0.00	\$45.78
7	88	\$34.28	\$10.80	\$10.45	\$0.00	\$55.53
8	94	\$36.73	\$10.80	\$10.45	\$0.00	\$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

HOISTING ENGINEER/CRANES/GRADALLS	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
OPERATING ENGINEERS LOCAL 4	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$27.13	\$13.00	\$0.00	\$0.00	\$40.13
2	60	\$29.60	\$13.00	\$15.70	\$0.00	\$58.30
3	65	\$32.06	\$13.00	\$15.70	\$0.00	\$60.76
4	70	\$34.53	\$13.00	\$15.70	\$0.00	\$63.23
5	75	\$37.00	\$13.00	\$15.70	\$0.00	\$65.70
6	80	\$39.46	\$13.00	\$15.70	\$0.00	\$68.16
7	85	\$41.93	\$13.00	\$15.70	\$0.00	\$70.63
8	90	\$44.40	\$13.00	\$15.70	\$0.00	\$73.10

Effective Date - 12/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$27.76	\$13.00	\$0.00	\$0.00	\$40.76
2	60	\$30.29	\$13.00	\$15.70	\$0.00	\$58.99
3	65	\$32.81	\$13.00	\$15.70	\$0.00	\$61.51
4	70	\$35.34	\$13.00	\$15.70	\$0.00	\$64.04
5	75	\$37.86	\$13.00	\$15.70	\$0.00	\$66.56
6	80	\$40.38	\$13.00	\$15.70	\$0.00	\$69.08
7	85	\$42.91	\$13.00	\$15.70	\$0.00	\$71.61
8	90	\$45.43	\$13.00	\$15.70	\$0.00	\$74.13

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - B	04/01/2020	\$36.46	\$13.20	\$16.55	\$1.99	\$68.20
	10/01/2020	\$37.46	\$13.20	\$16.55	\$2.02	\$69.23
	04/01/2021	\$38.21	\$13.20	\$16.55	\$2.04	\$70.00
	10/01/2021	\$39.21	\$13.20	\$16.55	\$2.07	\$71.03
	04/01/2022	\$40.21	\$13.20	\$16.55	\$2.10	\$72.06

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 223	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22
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For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 - B	04/01/2020	\$36.46	\$13.20	\$16.55	\$1.99	\$68.20
	10/01/2020	\$37.46	\$13.20	\$16.55	\$2.02	\$69.23
	04/01/2021	\$38.21	\$13.20	\$16.55	\$2.04	\$70.00
	10/01/2021	\$39.21	\$13.20	\$16.55	\$2.07	\$71.03
	04/01/2022	\$40.21	\$13.20	\$16.55	\$2.10	\$72.06

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING - WATER) PLUMBERS & PIPEFITTERS LOCAL 51	08/31/2020	\$45.84	\$10.00	\$18.80	\$0.00	\$74.64
	08/30/2021	\$47.84	\$10.00	\$18.80	\$0.00	\$76.64

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/31/2020	\$45.84	\$10.00	\$18.80	\$0.00	\$74.64
	08/30/2021	\$47.84	\$10.00	\$18.80	\$0.00	\$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.81	\$8.60	\$15.77	\$0.00	\$59.18
	12/01/2020	\$35.70	\$8.60	\$15.77	\$0.00	\$60.07
	06/01/2021	\$36.62	\$8.60	\$15.77	\$0.00	\$60.99
	12/01/2021	\$37.53	\$8.60	\$15.77	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)</i>	09/01/2020	\$44.10	\$13.80	\$17.14	\$0.00	\$75.04
	09/01/2021	\$46.50	\$13.80	\$17.14	\$0.00	\$77.44
	09/01/2022	\$48.95	\$13.80	\$17.14	\$0.00	\$79.89

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.05	\$13.80	\$12.42	\$0.00	\$48.27
2	60	\$26.46	\$13.80	\$13.36	\$0.00	\$53.62
3	70	\$30.87	\$13.80	\$14.31	\$0.00	\$58.98
4	80	\$35.28	\$13.80	\$15.25	\$0.00	\$64.33

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.25	\$13.80	\$12.42	\$0.00	\$49.47
2	60	\$27.90	\$13.80	\$13.36	\$0.00	\$55.06
3	70	\$32.55	\$13.80	\$14.31	\$0.00	\$60.66
4	80	\$37.20	\$13.80	\$15.25	\$0.00	\$66.25

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 37</i>	09/16/2020	\$41.51	\$7.70	\$17.10	\$0.00	\$66.31
	03/16/2021	\$42.46	\$7.70	\$17.10	\$0.00	\$67.26

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - IRONWORKER - Local 37

Effective Date - 09/16/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	\$29.06	\$7.70	\$17.10	\$0.00	\$53.86
2	75	\$31.13	\$7.70	\$17.10	\$0.00	\$55.93
3	80	\$33.21	\$7.70	\$17.10	\$0.00	\$58.01
4	85	\$35.28	\$7.70	\$17.10	\$0.00	\$60.08
5	90	\$37.36	\$7.70	\$17.10	\$0.00	\$62.16
6	95	\$39.43	\$7.70	\$17.10	\$0.00	\$64.23

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	\$29.72	\$7.70	\$17.10	\$0.00	\$54.52
2	75	\$31.85	\$7.70	\$17.10	\$0.00	\$56.65
3	80	\$33.97	\$7.70	\$17.10	\$0.00	\$58.77
4	85	\$36.09	\$7.70	\$17.10	\$0.00	\$60.89
5	90	\$38.21	\$7.70	\$17.10	\$0.00	\$63.01
6	95	\$40.34	\$7.70	\$17.10	\$0.00	\$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 2	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$20.44	\$8.60	\$15.77	\$0.00	\$44.81
2	70	\$23.84	\$8.60	\$15.77	\$0.00	\$48.21
3	80	\$27.25	\$8.60	\$15.77	\$0.00	\$51.62
4	90	\$30.65	\$8.60	\$15.77	\$0.00	\$55.02

Effective Date - 12/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$20.97	\$8.60	\$15.77	\$0.00	\$45.34
2	70	\$24.47	\$8.60	\$15.77	\$0.00	\$48.84
3	80	\$27.96	\$8.60	\$15.77	\$0.00	\$52.33
4	90	\$31.46	\$8.60	\$15.77	\$0.00	\$55.83

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.15	\$8.60	\$15.83	\$0.00	\$58.58
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For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

For apprentice rates see "Apprentice- LABORER"

LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR LABORERS - ZONE 2	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2020	\$42.57	\$10.75	\$20.27	\$0.00	\$73.59
	02/01/2021	\$43.08	\$10.75	\$20.27	\$0.00	\$74.10
	08/01/2021	\$44.20	\$10.75	\$20.43	\$0.00	\$75.38
	02/01/2022	\$44.67	\$10.75	\$20.43	\$0.00	\$75.85

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

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.29	\$10.75	\$20.27	\$0.00	\$52.31
2	60	\$25.54	\$10.75	\$20.27	\$0.00	\$56.56
3	70	\$29.80	\$10.75	\$20.27	\$0.00	\$60.82
4	80	\$34.06	\$10.75	\$20.27	\$0.00	\$65.08
5	90	\$38.31	\$10.75	\$20.27	\$0.00	\$69.33

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.54	\$10.75	\$20.27	\$0.00	\$52.56
2	60	\$25.85	\$10.75	\$20.27	\$0.00	\$56.87
3	70	\$30.16	\$10.75	\$20.27	\$0.00	\$61.18
4	80	\$34.46	\$10.75	\$20.27	\$0.00	\$65.48
5	90	\$38.77	\$10.75	\$20.27	\$0.00	\$69.79

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2020	\$55.77	\$10.75	\$22.08	\$0.00	\$88.60
	02/01/2021	\$56.41	\$10.75	\$22.08	\$0.00	\$89.24
	08/01/2021	\$57.81	\$10.75	\$22.24	\$0.00	\$90.80
	02/01/2022	\$58.38	\$10.75	\$22.24	\$0.00	\$91.37

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.89	\$10.75	\$22.08	\$0.00	\$60.72
2	60	\$33.46	\$10.75	\$22.08	\$0.00	\$66.29
3	70	\$39.04	\$10.75	\$22.08	\$0.00	\$71.87
4	80	\$44.62	\$10.75	\$22.08	\$0.00	\$77.45
5	90	\$50.19	\$10.75	\$22.08	\$0.00	\$83.02

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.21	\$10.75	\$22.08	\$0.00	\$61.04
2	60	\$33.85	\$10.75	\$22.08	\$0.00	\$66.68
3	70	\$39.49	\$10.75	\$22.08	\$0.00	\$72.32
4	80	\$45.13	\$10.75	\$22.08	\$0.00	\$77.96
5	90	\$50.77	\$10.75	\$22.08	\$0.00	\$83.60

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) <i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>	04/01/2019	\$38.87	\$9.90	\$18.50	\$0.00	\$67.27
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Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 04/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.38	\$9.90	\$5.31	\$0.00	\$36.59
2	65	\$25.27	\$9.90	\$15.13	\$0.00	\$50.30
3	75	\$29.15	\$9.90	\$16.10	\$0.00	\$55.15
4	85	\$33.04	\$9.90	\$17.06	\$0.00	\$60.00

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER LABORERS - ZONE 2	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2020	\$23.13	\$13.00	\$15.70	\$0.00	\$51.83
	12/01/2020	\$23.70	\$13.00	\$15.70	\$0.00	\$52.40
	06/01/2021	\$24.25	\$13.00	\$15.70	\$0.00	\$52.95
	12/01/2021	\$24.83	\$13.00	\$15.70	\$0.00	\$53.53

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2020	\$27.79	\$13.00	\$15.70	\$0.00	\$56.49
	12/01/2020	\$28.47	\$13.00	\$15.70	\$0.00	\$57.17
	06/01/2021	\$29.11	\$13.00	\$15.70	\$0.00	\$57.81
	12/01/2021	\$29.79	\$13.00	\$15.70	\$0.00	\$58.49

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	07/01/2020	\$51.51	\$8.25	\$22.40	\$0.00	\$82.16
	01/01/2021	\$52.06	\$8.25	\$22.75	\$0.00	\$83.06

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.76	\$8.25	\$0.00	\$0.00	\$34.01
2	55	\$28.33	\$8.25	\$6.05	\$0.00	\$42.63
3	60	\$30.91	\$8.25	\$6.60	\$0.00	\$45.76
4	65	\$33.48	\$8.25	\$7.15	\$0.00	\$48.88
5	70	\$36.06	\$8.25	\$19.10	\$0.00	\$63.41
6	75	\$38.63	\$8.25	\$19.65	\$0.00	\$66.53
7	80	\$41.21	\$8.25	\$20.20	\$0.00	\$69.66
8	90	\$46.36	\$8.25	\$21.30	\$0.00	\$75.91

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.03	\$8.25	\$0.00	\$0.00	\$34.28
2	55	\$28.63	\$8.25	\$6.16	\$0.00	\$43.04
3	60	\$31.24	\$8.25	\$6.72	\$0.00	\$46.21
4	65	\$33.84	\$8.25	\$7.28	\$0.00	\$49.37
5	70	\$36.44	\$8.25	\$19.39	\$0.00	\$64.08
6	75	\$39.05	\$8.25	\$19.95	\$0.00	\$67.25
7	80	\$41.65	\$8.25	\$20.51	\$0.00	\$70.41
8	90	\$46.85	\$8.25	\$21.63	\$0.00	\$76.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2020	\$41.21	\$8.25	\$22.40	\$0.00	\$71.86
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	01/01/2021	\$42.96	\$8.25	\$22.75	\$0.00	\$73.96

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.61	\$8.25	\$0.00	\$0.00	\$28.86
2	55	\$22.67	\$8.25	\$6.05	\$0.00	\$36.97
3	60	\$24.73	\$8.25	\$6.60	\$0.00	\$39.58
4	65	\$26.79	\$8.25	\$7.15	\$0.00	\$42.19
5	70	\$28.85	\$8.25	\$19.10	\$0.00	\$56.20
6	75	\$30.91	\$8.25	\$19.65	\$0.00	\$58.81
7	80	\$32.97	\$8.25	\$20.20	\$0.00	\$61.42
8	90	\$37.09	\$8.25	\$21.30	\$0.00	\$66.64

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.48	\$8.25	\$0.00	\$0.00	\$29.73
2	55	\$23.63	\$8.25	\$6.16	\$0.00	\$38.04
3	60	\$25.78	\$8.25	\$6.72	\$0.00	\$40.75
4	65	\$27.92	\$8.25	\$7.28	\$0.00	\$43.45
5	70	\$30.07	\$8.25	\$19.39	\$0.00	\$57.71
6	75	\$32.22	\$8.25	\$19.95	\$0.00	\$60.42
7	80	\$34.37	\$8.25	\$20.51	\$0.00	\$63.13
8	90	\$38.66	\$8.25	\$21.63	\$0.00	\$68.54

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	07/01/2020	\$40.47	\$8.25	\$22.40	\$0.00	\$71.12
PAINTERS LOCAL 35 - ZONE 2	01/01/2021	\$41.02	\$8.25	\$22.75	\$0.00	\$72.02

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.24	\$8.25	\$0.00	\$0.00	\$28.49
2	55	\$22.26	\$8.25	\$6.05	\$0.00	\$36.56
3	60	\$24.28	\$8.25	\$6.60	\$0.00	\$39.13
4	65	\$26.31	\$8.25	\$7.15	\$0.00	\$41.71
5	70	\$28.33	\$8.25	\$19.10	\$0.00	\$55.68
6	75	\$30.35	\$8.25	\$19.65	\$0.00	\$58.25
7	80	\$32.38	\$8.25	\$20.20	\$0.00	\$60.83
8	90	\$36.42	\$8.25	\$21.30	\$0.00	\$65.97

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.51	\$8.25	\$0.00	\$0.00	\$28.76
2	55	\$22.56	\$8.25	\$6.16	\$0.00	\$36.97
3	60	\$24.61	\$8.25	\$6.72	\$0.00	\$39.58
4	65	\$26.66	\$8.25	\$7.28	\$0.00	\$42.19
5	70	\$28.71	\$8.25	\$19.39	\$0.00	\$56.35
6	75	\$30.77	\$8.25	\$19.95	\$0.00	\$58.97
7	80	\$32.82	\$8.25	\$20.51	\$0.00	\$61.58
8	90	\$36.92	\$8.25	\$21.63	\$0.00	\$66.80

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) LABORERS - ZONE 2	06/01/2020	\$34.06	\$8.60	\$15.77	\$0.00	\$58.43
	12/01/2020	\$34.95	\$8.60	\$15.77	\$0.00	\$59.32
	06/01/2021	\$35.87	\$8.60	\$15.77	\$0.00	\$60.24
	12/01/2021	\$36.78	\$8.60	\$15.77	\$0.00	\$61.15

For Apprentice rates see "Apprentice- LABORER"

PAINTER / TAPER (BRUSH, NEW) *	07/01/2020	\$41.01	\$8.25	\$22.40	\$0.00	\$71.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	01/01/2021	\$41.56	\$8.25	\$22.75	\$0.00	\$72.56

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.51	\$8.25	\$0.00	\$0.00	\$28.76
2	55	\$22.56	\$8.25	\$6.05	\$0.00	\$36.86
3	60	\$24.61	\$8.25	\$6.60	\$0.00	\$39.46
4	65	\$26.66	\$8.25	\$7.15	\$0.00	\$42.06
5	70	\$28.71	\$8.25	\$19.10	\$0.00	\$56.06
6	75	\$30.76	\$8.25	\$19.65	\$0.00	\$58.66
7	80	\$32.81	\$8.25	\$20.20	\$0.00	\$61.26
8	90	\$36.91	\$8.25	\$21.30	\$0.00	\$66.46

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.78	\$8.25	\$0.00	\$0.00	\$29.03
2	55	\$22.86	\$8.25	\$6.16	\$0.00	\$37.27
3	60	\$24.94	\$8.25	\$6.72	\$0.00	\$39.91
4	65	\$27.01	\$8.25	\$7.28	\$0.00	\$42.54
5	70	\$29.09	\$8.25	\$19.39	\$0.00	\$56.73
6	75	\$31.17	\$8.25	\$19.95	\$0.00	\$59.37
7	80	\$33.25	\$8.25	\$20.51	\$0.00	\$62.01
8	90	\$37.40	\$8.25	\$21.63	\$0.00	\$67.28

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	07/01/2020	\$39.07	\$8.25	\$22.40	\$0.00	\$69.72
PAINTERS LOCAL 35 - ZONE 2	01/01/2021	\$39.62	\$8.25	\$22.75	\$0.00	\$70.62

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.54	\$8.25	\$0.00	\$0.00	\$27.79
2	55	\$21.49	\$8.25	\$6.05	\$0.00	\$35.79
3	60	\$23.44	\$8.25	\$6.60	\$0.00	\$38.29
4	65	\$25.40	\$8.25	\$7.15	\$0.00	\$40.80
5	70	\$27.35	\$8.25	\$19.10	\$0.00	\$54.70
6	75	\$29.30	\$8.25	\$19.65	\$0.00	\$57.20
7	80	\$31.26	\$8.25	\$20.20	\$0.00	\$59.71
8	90	\$35.16	\$8.25	\$21.30	\$0.00	\$64.71

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.81	\$8.25	\$0.00	\$0.00	\$28.06
2	55	\$21.79	\$8.25	\$6.16	\$0.00	\$36.20
3	60	\$23.77	\$8.25	\$6.72	\$0.00	\$38.74
4	65	\$25.75	\$8.25	\$7.28	\$0.00	\$41.28
5	70	\$27.73	\$8.25	\$19.39	\$0.00	\$55.37
6	75	\$29.72	\$8.25	\$19.95	\$0.00	\$57.92
7	80	\$31.70	\$8.25	\$20.51	\$0.00	\$60.46
8	90	\$35.66	\$8.25	\$21.63	\$0.00	\$65.54

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$34.98	\$12.91	\$13.72	\$0.00	\$61.61
	12/01/2020	\$34.98	\$12.91	\$14.82	\$0.00	\$62.71
	06/01/2021	\$35.78	\$12.91	\$14.82	\$0.00	\$63.51
	08/01/2021	\$35.78	\$13.41	\$14.82	\$0.00	\$64.01
	12/01/2021	\$35.78	\$13.41	\$16.01	\$0.00	\$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i> For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$9.40	\$23.12	\$0.00	\$57.06
2	60	\$29.44	\$9.40	\$23.12	\$0.00	\$61.96
3	70	\$34.35	\$9.40	\$23.12	\$0.00	\$66.87
4	75	\$36.80	\$9.40	\$23.12	\$0.00	\$69.32
5	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
6	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
7	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68
8	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$34.01/ 3&4 \$41.46/ 5&6 \$62.80/ 7&8 \$69.25

Apprentice to Journeyworker Ratio:1:5

PIPELAYER LABORERS - ZONE 2	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40

For apprentice rates see "Apprentice- LABORER"

PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51	08/31/2020	\$45.84	\$10.00	\$18.80	\$0.00	\$74.64
	08/30/2021	\$47.84	\$10.00	\$18.80	\$0.00	\$76.64

Apprentice - PLUMBER/PIPEFITTER - Local 51

Effective Date - 08/31/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.34	\$10.00	\$2.50	\$0.00	\$30.84
2	50	\$22.92	\$10.00	\$2.50	\$0.00	\$35.42
3	60	\$27.50	\$10.00	\$8.48	\$0.00	\$45.98
4	70	\$32.09	\$10.00	\$13.56	\$0.00	\$55.65
5	80	\$36.67	\$10.00	\$16.95	\$0.00	\$63.62

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.14	\$10.00	\$2.50	\$0.00	\$31.64
2	50	\$23.92	\$10.00	\$2.50	\$0.00	\$36.42
3	60	\$28.70	\$10.00	\$8.48	\$0.00	\$47.18
4	70	\$33.49	\$10.00	\$13.56	\$0.00	\$57.05
5	80	\$38.27	\$10.00	\$16.95	\$0.00	\$65.22

Notes:

Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/31/2020	\$45.84	\$10.00	\$18.80	\$0.00	\$74.64
	08/30/2021	\$47.84	\$10.00	\$18.80	\$0.00	\$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	06/01/2020	\$35.06	\$8.60	\$15.77	\$0.00	\$59.43
	12/01/2020	\$35.95	\$8.60	\$15.77	\$0.00	\$60.32
	06/01/2021	\$36.87	\$8.60	\$15.77	\$0.00	\$61.24
	12/01/2021	\$37.78	\$8.60	\$15.77	\$0.00	\$62.15
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$32.72	\$13.00	\$15.70	\$0.00	\$61.42
	12/01/2020	\$33.50	\$13.00	\$15.70	\$0.00	\$62.20
	06/01/2021	\$34.25	\$13.00	\$15.70	\$0.00	\$62.95
	12/01/2021	\$35.04	\$13.00	\$15.70	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 653 - Southeastern Concrete (Weymouth)</i>	08/01/2020	\$23.50	\$12.41	\$6.90	\$0.00	\$42.81
	05/01/2021	\$24.00	\$12.41	\$6.90	\$0.00	\$43.31
	08/01/2021	\$24.00	\$12.91	\$6.90	\$0.00	\$43.81
	05/01/2022	\$24.50	\$12.91	\$6.90	\$0.00	\$44.31
	08/01/2022	\$24.50	\$13.41	\$6.90	\$0.00	\$44.81
	05/01/2023	\$25.00	\$13.41	\$6.90	\$0.00	\$45.31
	08/01/2023	\$25.00	\$13.91	\$6.90	\$0.00	\$45.81
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg) <i>ROOFERS LOCAL 33</i>	08/01/2020	\$46.60	\$11.75	\$16.15	\$0.00	\$74.50
	02/01/2021	\$48.03	\$11.75	\$16.15	\$0.00	\$75.93
	08/01/2021	\$49.46	\$11.75	\$16.15	\$0.00	\$77.36
	02/01/2022	\$50.89	\$11.75	\$16.15	\$0.00	\$78.79

Apprentice - ROOFER - Local 33

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.30	\$11.75	\$3.81	\$0.00	\$38.86
2	60	\$27.96	\$11.75	\$16.15	\$0.00	\$55.86
3	65	\$30.29	\$11.75	\$16.15	\$0.00	\$58.19
4	75	\$34.95	\$11.75	\$16.15	\$0.00	\$62.85
5	85	\$39.61	\$11.75	\$16.15	\$0.00	\$67.51

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.02	\$11.75	\$3.81	\$0.00	\$39.58
2	60	\$28.82	\$11.75	\$16.15	\$0.00	\$56.72
3	65	\$31.22	\$11.75	\$16.15	\$0.00	\$59.12
4	75	\$36.02	\$11.75	\$16.15	\$0.00	\$63.92
5	85	\$40.83	\$11.75	\$16.15	\$0.00	\$68.73

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE <i>ROOFERS LOCAL 33</i>	08/01/2020	\$46.85	\$11.75	\$16.15	\$0.00	\$74.75
	02/01/2021	\$48.28	\$11.75	\$16.15	\$0.00	\$76.18
	08/01/2021	\$49.71	\$11.75	\$16.15	\$0.00	\$77.61
	02/01/2022	\$51.14	\$11.75	\$16.15	\$0.00	\$79.04

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER <i>SHEETMETAL WORKERS LOCAL 17 - B</i>	04/01/2020	\$36.46	\$13.20	\$16.55	\$1.99	\$68.20
	10/01/2020	\$37.46	\$13.20	\$16.55	\$2.02	\$69.23
	04/01/2021	\$38.21	\$13.20	\$16.55	\$2.04	\$70.00
	10/01/2021	\$39.21	\$13.20	\$16.55	\$2.07	\$71.03
	04/01/2022	\$40.21	\$13.20	\$16.55	\$2.10	\$72.06

Apprentice - SHEET METAL WORKER - Local 17-B

Effective Date - 04/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.58	\$13.20	\$0.00	\$0.83	\$28.61
2	45	\$16.41	\$13.20	\$0.00	\$0.89	\$30.50
3	50	\$18.23	\$13.20	\$11.48	\$1.29	\$44.20
4	55	\$20.05	\$13.20	\$11.48	\$1.34	\$46.07
5	60	\$21.88	\$13.20	\$14.52	\$1.49	\$51.09
6	65	\$23.70	\$13.20	\$14.78	\$1.55	\$53.23
7	70	\$25.52	\$13.20	\$15.03	\$1.61	\$55.36
8	75	\$27.35	\$13.20	\$15.28	\$1.67	\$57.50
9	80	\$29.17	\$13.20	\$15.54	\$1.74	\$59.65
10	85	\$30.99	\$13.20	\$15.79	\$1.80	\$61.78

Effective Date - 10/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.98	\$13.20	\$0.00	\$0.85	\$29.03
2	45	\$16.86	\$13.20	\$0.00	\$0.90	\$30.96
3	50	\$18.73	\$13.20	\$11.48	\$1.30	\$44.71
4	55	\$20.60	\$13.20	\$11.48	\$1.36	\$46.64
5	60	\$22.48	\$13.20	\$14.52	\$1.51	\$51.71
6	65	\$24.35	\$13.20	\$14.78	\$1.57	\$53.90
7	70	\$26.22	\$13.20	\$15.03	\$1.63	\$56.08
8	75	\$28.10	\$13.20	\$15.28	\$1.70	\$58.28
9	80	\$29.97	\$13.20	\$15.54	\$1.76	\$60.47
10	85	\$31.84	\$13.20	\$15.79	\$1.82	\$62.65

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.44	\$12.91	\$13.72	\$0.00	\$62.07
	12/01/2020	\$35.44	\$12.91	\$14.82	\$0.00	\$63.17
	06/01/2021	\$36.24	\$12.91	\$14.82	\$0.00	\$63.97
	08/01/2021	\$36.24	\$13.41	\$14.82	\$0.00	\$64.47
	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.73	\$12.91	\$13.72	\$0.00	\$62.36
	12/01/2020	\$35.73	\$12.91	\$14.82	\$0.00	\$63.46
	06/01/2021	\$36.53	\$12.91	\$14.82	\$0.00	\$64.26
	08/01/2021	\$36.53	\$13.41	\$14.82	\$0.00	\$64.76
	12/01/2021	\$36.53	\$13.41	\$16.01	\$0.00	\$65.95
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2</i>	03/01/2020	\$54.74	\$9.68	\$20.55	\$0.00	\$84.97
	10/01/2020	\$56.09	\$9.68	\$20.55	\$0.00	\$86.32
	03/01/2021	\$57.44	\$9.68	\$20.55	\$0.00	\$87.67

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SPRINKLER FITTER - Local 550 (Section B) Zone 2

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.16	\$9.68	\$11.61	\$0.00	\$40.45
2	40	\$21.90	\$9.68	\$12.30	\$0.00	\$43.88
3	45	\$24.63	\$9.68	\$12.99	\$0.00	\$47.30
4	50	\$27.37	\$9.68	\$13.73	\$0.00	\$50.78
5	55	\$30.11	\$9.68	\$14.36	\$0.00	\$54.15
6	60	\$32.84	\$9.68	\$15.05	\$0.00	\$57.57
7	65	\$35.58	\$9.68	\$15.74	\$0.00	\$61.00
8	70	\$38.32	\$9.68	\$16.43	\$0.00	\$64.43
9	75	\$41.06	\$9.68	\$17.11	\$0.00	\$67.85
10	80	\$43.79	\$9.68	\$17.80	\$0.00	\$71.27

Effective Date - 10/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.63	\$9.68	\$11.61	\$0.00	\$40.92
2	40	\$22.44	\$9.68	\$12.30	\$0.00	\$44.42
3	45	\$25.24	\$9.68	\$12.99	\$0.00	\$47.91
4	50	\$28.05	\$9.68	\$13.73	\$0.00	\$51.46
5	55	\$30.85	\$9.68	\$14.36	\$0.00	\$54.89
6	60	\$33.65	\$9.68	\$15.05	\$0.00	\$58.38
7	65	\$36.46	\$9.68	\$15.74	\$0.00	\$61.88
8	70	\$39.26	\$9.68	\$16.43	\$0.00	\$65.37
9	75	\$42.07	\$9.68	\$17.11	\$0.00	\$68.86
10	80	\$44.87	\$9.68	\$17.80	\$0.00	\$72.35

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$36.86	\$10.90	\$12.45	\$0.00	\$60.21
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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2020	\$54.69	\$10.75	\$22.09	\$0.00	\$87.53
	02/01/2021	\$55.33	\$10.75	\$22.09	\$0.00	\$88.17
	08/01/2021	\$56.73	\$10.75	\$22.25	\$0.00	\$89.73
	02/01/2022	\$57.32	\$10.75	\$22.25	\$0.00	\$90.32

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.35	\$10.75	\$22.09	\$0.00	\$60.19
2	60	\$32.81	\$10.75	\$22.09	\$0.00	\$65.65
3	70	\$38.28	\$10.75	\$22.09	\$0.00	\$71.12
4	80	\$43.75	\$10.75	\$22.09	\$0.00	\$76.59
5	90	\$49.22	\$10.75	\$22.09	\$0.00	\$82.06

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.67	\$10.75	\$22.09	\$0.00	\$60.51
2	60	\$33.20	\$10.75	\$22.09	\$0.00	\$66.04
3	70	\$38.73	\$10.75	\$22.09	\$0.00	\$71.57
4	80	\$44.26	\$10.75	\$22.09	\$0.00	\$77.10
5	90	\$49.80	\$10.75	\$22.09	\$0.00	\$82.64

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER LABORERS - FOUNDATION AND MARINE	06/01/2020	\$40.55	\$8.60	\$17.24	\$0.00	\$66.39
	12/01/2020	\$41.53	\$8.60	\$17.24	\$0.00	\$67.37
	06/01/2021	\$42.55	\$8.60	\$17.24	\$0.00	\$68.39
	12/01/2021	\$43.56	\$8.60	\$17.24	\$0.00	\$69.40

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER LABORERS - FOUNDATION AND MARINE	06/01/2020	\$39.27	\$8.60	\$17.24	\$0.00	\$65.11
	12/01/2020	\$40.25	\$8.60	\$17.24	\$0.00	\$66.09
	06/01/2021	\$41.27	\$8.60	\$17.24	\$0.00	\$67.11
	12/01/2021	\$42.28	\$8.60	\$17.24	\$0.00	\$68.12

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2020	\$39.15	\$8.60	\$17.24	\$0.00	\$64.99
	12/01/2020	\$40.13	\$8.60	\$17.24	\$0.00	\$65.97
	06/01/2021	\$41.15	\$8.60	\$17.24	\$0.00	\$66.99
	12/01/2021	\$42.16	\$8.60	\$17.24	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
	12/01/2020	\$49.95	\$13.00	\$15.70	\$0.00	\$78.65
	06/01/2021	\$51.04	\$13.00	\$15.70	\$0.00	\$79.74
	12/01/2021	\$52.18	\$13.00	\$15.70	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$36.02	\$12.91	\$13.72	\$0.00	\$62.65
	12/01/2020	\$36.02	\$12.91	\$14.82	\$0.00	\$63.75
	06/01/2021	\$36.82	\$12.91	\$14.82	\$0.00	\$64.55
	08/01/2021	\$36.82	\$13.41	\$14.82	\$0.00	\$65.05
	12/01/2021	\$36.82	\$13.41	\$16.01	\$0.00	\$66.24
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	06/01/2020	\$51.38	\$8.60	\$17.69	\$0.00	\$77.67
	12/01/2020	\$52.36	\$8.60	\$17.69	\$0.00	\$78.65
	06/01/2021	\$53.38	\$8.60	\$17.69	\$0.00	\$79.67
	12/01/2021	\$54.39	\$8.60	\$17.69	\$0.00	\$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	06/01/2020	\$53.38	\$8.60	\$17.69	\$0.00	\$79.67
	12/01/2020	\$54.36	\$8.60	\$17.69	\$0.00	\$80.65
	06/01/2021	\$55.38	\$8.60	\$17.69	\$0.00	\$81.67
	12/01/2021	\$56.39	\$8.60	\$17.69	\$0.00	\$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2020	\$43.45	\$8.60	\$17.69	\$0.00	\$69.74
	12/01/2020	\$44.43	\$8.60	\$17.69	\$0.00	\$70.72
	06/01/2021	\$45.45	\$8.60	\$17.69	\$0.00	\$71.74
	12/01/2021	\$46.46	\$8.60	\$17.69	\$0.00	\$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2020	\$45.45	\$8.60	\$17.69	\$0.00	\$71.74
	12/01/2020	\$46.43	\$8.60	\$17.69	\$0.00	\$72.72
	06/01/2021	\$47.45	\$8.60	\$17.69	\$0.00	\$73.74
	12/01/2021	\$48.46	\$8.60	\$17.69	\$0.00	\$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	08/01/2020	\$35.44	\$12.91	\$13.72	\$0.00	\$62.07
	12/01/2020	\$35.44	\$12.91	\$14.82	\$0.00	\$63.17
	06/01/2021	\$36.24	\$12.91	\$14.82	\$0.00	\$63.97
	08/01/2021	\$36.24	\$13.41	\$14.82	\$0.00	\$64.47
	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
	12/01/2020	\$35.20	\$8.60	\$15.77	\$0.00	\$59.57
	06/01/2021	\$36.12	\$8.60	\$15.77	\$0.00	\$60.49
	12/01/2021	\$37.03	\$8.60	\$15.77	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2020	\$49.33	\$13.00	\$15.70	\$0.00	\$78.03
	12/01/2020	\$50.48	\$13.00	\$15.70	\$0.00	\$79.18
	06/01/2021	\$51.58	\$13.00	\$15.70	\$0.00	\$80.28
	12/01/2021	\$52.73	\$13.00	\$15.70	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/31/2020	\$45.84	\$10.00	\$18.80	\$0.00	\$74.64
	08/30/2021	\$47.84	\$10.00	\$18.80	\$0.00	\$76.64
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$29.67	\$9.25	\$1.89	\$0.00	\$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$10.27	\$0.00	\$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$34.62	\$9.25	\$10.07	\$0.00	\$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$14.35	\$0.00	\$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$37.09	\$9.25	\$10.87	\$0.00	\$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$22.25	\$9.25	\$1.67	\$0.00	\$33.17
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$49.45	\$9.25	\$17.48	\$0.00	\$76.18

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$29.67	\$9.25	\$3.39	\$0.00	\$42.31
2	65	\$32.14	\$9.25	\$3.46	\$0.00	\$44.85
3	70	\$34.62	\$9.25	\$3.54	\$0.00	\$47.41
4	75	\$37.09	\$9.25	\$5.11	\$0.00	\$51.45
5	80	\$39.56	\$9.25	\$5.19	\$0.00	\$54.00
6	85	\$42.03	\$9.25	\$5.26	\$0.00	\$56.54
7	90	\$44.51	\$9.25	\$7.34	\$0.00	\$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$30.73	\$4.70	\$3.17	\$0.00	\$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77

Additional Apprentice Information:

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

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

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

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

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

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

STATEMENT OF COMPLIANCE

_____, 20_____

I, _____,
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Work covered by Contract Documents.
- B. Work by others.
- C. Contractor's use of Site.
- D. Limits of Work area.
- E. Construction permits and easements.
- F. Future Work
- G. Sequence of Work.
- H. Connections to existing facilities.
- I. Alteration Project Procedures
- J. Cutting and Patching
- K. Facility outages.
- L. Continuity of service plan.
- M. Requests to work outside normal working hours.

1.02. PROJECT – WORK COVERED BY CONTRACT DOCUMENTS

- A. Work covered by the Contract Documents is described in the Agreement.
- B. Work not specifically identified in the Bid Item Descriptions, but nevertheless required in the Contract Documents, shall be performed as shown and/or specified.

1.03. WORK BY OTHERS

- A. Contractor shall cooperate and coordinate with Owner and all others performing other work at the Site.

1.04. CONTRACTOR USE OF SITE

- A. Contractor shall limit the use of the Site for the Work and for storage to allow for :
 - 1. Owner occupancy and/or partial utilization.
 - 2. Work by others and work by Owner.

3. Use of Site by public for travel (public and private roads).
- B. Coordinate the use of the Site with the Owner and the Engineer.
- C. Contractor shall assume full responsibility for the security of his/her Subcontractor's materials and equipment stored on the site, as well as his own.
- D. If directed by the Owner or Engineer, move any stored items which interfere with the operations of the Owner or other Contractors.

1.05. LIMITS OF WORK AREA

- A. Confine construction operations within the Limits of Work shown on the Drawings and within the road right-of-way or property boundary when Limits of Work are not shown on the Drawings.
- B. Storage of equipment and materials, or erection and use of sheds outside of the Limits of Work, if such areas are the property of Owner, shall be used only with Owner's approval. Such storage or temporary structures, even within the Limits of Work, shall be confined to Owner's property and shall not be placed on properties designated as easements or rights-of-way.
- C. Permanent and temporary easements or rights-of-way across private property, which are shown or defined as work areas within the Limits of Work, have been obtained by Owner. Where Contractor's work requires his entry into easement areas to investigate, alter, or replace existing water mains, water services, sewer mains, sewer laterals, and their associated structures, Owner will provide information on such easements and means of access thereto.
- D. Easements and Rights-of-Way
 1. Limit use of and access to easements and rights-of-way to personnel and equipment necessary to perform Work allowed by easement or rights-of-way documents.
 2. Maintain existing protective barriers, such as fences, gates, shrubbery barriers, or other containment devices installed to protect people or private property, such as pets or livestock. Contractor shall be responsible to mitigate damages resulting from Contractor's failure to maintain existing protective barriers.
 3. Maintain adequate access to private property by public service entities, such as US mail, delivery services, utilities, police, fire, rescue, or other emergency services. Contractor shall be responsible to mitigate damages resulting from Contractor's failure to maintain adequate access.
- E. Occupying Private Land
 1. The area available for the Contractor staging / storage is limited to the Limits of Work, property boundaries, permanent easements, and/or temporary construction easements shown on the Drawings or described within this Section. The Contractor is responsible for obtaining off-site staging / storage areas as required if these areas are insufficient for his activities. If Contractor intends to occupy private land other than land owned by Owner, land owned by Contractor, or land covered by easements and rights-of-way obtained by the Owner for the performance of the Work by the Contractor, then Contractor shall obtain written consent from the owner of the land the Contractor intends to occupy.

2. Contractor shall obtain written consent before Contractor enters or occupies the private land with equipment, tools, materials, or Contractor's personnel.
3. Contractor shall provide copies of written consent to the Owner before Contractor enters or occupies the private land.
4. Contractor shall obtain required permits for use of private lands including erosion and sedimentation control plan approval at no additional cost to Owner.

1.06. CONSTRUCTION PERMITS AND EASEMENTS

- A. Contractor shall obtain all necessary construction permits from those authorities or agencies having jurisdiction over land areas, utilities, or structures which are located within the Contract Limits and which will be occupied, encountered, used, or temporarily interrupted by Contractor's operations.
- B. When construction permits are accompanied by regulations or requirements issued by a particular authority or agency, it shall be Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this Project. All costs associated with additional field supervision or inspection by authorities or agencies having jurisdiction over land areas, utilities, or structures shall be Contractor's responsibility.
- C. Keep an approved set of permitted construction plans on site at all times.

1.07. OWNER OCCUPANCY

- A. The Owner will occupy each of the existing pumping station sites during entire period of construction.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.08. SEQUENCE OF WORK

A. GENERAL

1. Provide an intended sequence of construction in accordance with Specification Section 01300, Construction Progress Schedule.
2. Contractor shall be solely responsible for the means, manpower, methods, techniques, sequences, and procedures of construction unless specifically identified in the Contract Documents.
3. Contractor shall be responsible for sequencing and coordinating the Work in accordance with the Contract Documents:
4. Contractor shall provide temporary facilities to maintain continuous operation of all existing facilities and utilities unless scheduled facility shutdowns are identified in the Contract Documents.
5. Work shall be performed in a manner that minimizes impact to normal operation of existing facilities and utilities.

6. Contractor's operations shall not cause Owner to violate operating permit requirements.
7. If Contractor's operations cause Owner to receive a notice of violation for a sewage spill or erosion and sedimentation practices, all costs including fines, legal notices, mailings, administrative tasks, and engineering associated with resolving the notice shall be borne by Contractor.

1.09. OPERATION OF EXISTING FACILITIES

- A. Normal operations of the existing facilities (water and sewer utilities) will be performed by Owner. Only Owner's staff is allowed to operate existing facilities including equipment, valves, gates, motor controls, etc.
 1. Provide Owner and Engineer a minimum of two working days written notice of necessary operation of existing valves, pumps, or equipment to facilitate construction activities.
 2. Contractor's activities shall not disrupt Owner's access to operate and maintain existing equipment and facilities. Contractor shall furnish any temporary access required, including ladders, platforms, grating, and walkways, all which shall comply with OSHA laws and regulations, for necessary plant operations.
 3. Contractor's operations shall not disrupt truck access for operations or the delivery or hauling of materials and supplies to and from the Site.

1.10. CONNECTIONS TO EXISTING FACILITIES

- A. Contractor shall provide all cutting and patching required for connection to existing facilities.
- B. Temporary connections to existing facilities are covered in Section 01500, Temporary Facilities.
- C. General Contractor shall provide all openings, chases, etc., to fit its own Work and that of Contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by approved Shop Drawings, or shown on manufacturer's erection drawings, shall be provided by Contractor.
- D. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as an integral part of an opening, the sleeves opening forms or frames shall be furnished by the installer of the pipes, conduits, or equipment, but shall be installed by Contractor. Where hanger inserts, anchor bolts and similar items are to be installed as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the same, but shall be installed by Contractor.
- E. When requested by Contractor, the installer of the pipes, conduit, or equipment, including those Contractors who require openings or chases in slabs and walls for passage of ducts, mounting of equipment, etc., shall furnish all necessary information, instructions and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the Contractor for whom the items are installed shall ascertain the proper number, locations and settings thereof, and Contractor shall schedule its operations so as to provide a reasonable opportunity and time interval for such inspection.

- F. After installation of the pipe, conduit, or duct is completed, the installer shall be responsible for sealing the annular space around the installed pipe, conduit, or duct in accordance with current Laws and Regulations.
- G. Cost resulting from correction of defective, ill-timed, or incorrectly located work, or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc., shall be borne by the Contractor responsible therefore. To this end, no Contractor shall arbitrarily cut, drill, alter, damage, or otherwise endanger the work of another Contractor. The nature and extent of any corrective or additional work shall be subject to the approval of the Engineer following consultation with the Contractors involved.
- H. Contractor shall be responsible for all equipment and housekeeping pads and shall coordinate locations, sizes, and orientation with the installer. Coordination shall include verification of actual required size. Contractor shall not rely solely on the sizes shown on the Drawings.
- I. Temporary connections to existing facilities are covered in Section 01500, Temporary Facilities.

1.11. ALTERATION PROJECT PROCEDURES

- A. Materials: As specified in individual Specification sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
- G. Where a change of plane of 1/4 -inch or more occurs, submit recommendation for providing a smooth transition for Engineer review. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- H. Finish surfaces as specified in individual Specification sections.

1.12. CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.

3. Efficiency, maintenance, or safety of element.
 4. Visual qualities of sight-exposed elements.
 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
1. Fit the several parts together, to integrate with other work.
 2. Uncover work to install or correct ill-timed work.
 3. Remove and replace defective and non-conforming work.
 4. Remove samples of installed work for testing.
 5. Provide openings in elements of work for penetrations of mechanical and electrical work.
- D. Execute work by methods which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Notwithstanding any requirement of State or Federal laws, identify any hazardous substance or condition exposed during the Work to Engineer in writing for decision or remedy.

1.13. FACILITY OUTAGES

- A. General:
1. Provide a minimum of 15 working days written notice to Owner and Engineer prior to actual date of scheduled outage. Submit a plan for review and approval by Owner a minimum of 15 working days prior to a planned outage.
 2. All associated work that can be completed on a system without taking a unit or process out of service shall be completed prior to the outage to minimize down time.
 3. Have all required materials, labor, tools, and equipment on Site at the required locations and available for use prior to beginning an outage.
 4. A minimum of two power sources are required at all times (main power and backup generator). If at any time, a second power source cannot be maintained, the Contractor is required to provide a temporary generator or backup means of conveying wastewater. This includes arranging for septage trucks to convey wastewater or providing bypass pumping (must match incoming wastewater

flowrate). Provide all temporary facilities required for outages, including bypassing pumping, in accordance with Specification Section 01500, Temporary Facilities.

5. Outages cannot be scheduled to begin on a Friday or day before a scheduled Holiday or Special Event.
6. When temporary shutdowns are planned utilizing tankage with finite storage volumes and/or for limited timeframes, backup bypass pumping systems shall be on Site and immediately available for use during shutdowns in case facilities cannot be brought back on-line within the required time limits. Backup bypass pumps, if provided, must be provided with a fully operational spare pump to match largest pump size and shall either be manned at all times or shall have controls that contact Contractor in the event of any alarm conditions.
7. Begin work on temporarily isolated facilities immediately after isolation and expedite.
8. During scheduled outages, complete all associated work within time frames and constraints identified in Contract Documents and the approved Continuity of Service Plan, including testing and Startup.
9. The Owner shall be responsible for operating Town-owned pumps and valves while the Contractor is responsible for draining and cleaning existing tanks, and removing liquid and solids from existing tanks, wet wells, and other water holding structures as required for new work. Owner will designate locations on Site for liquid and solids removed from the existing facilities to be pumped and/or hauled by Contractor. Contractor is responsible for final washdown and cleaning of existing facilities to the degree required to perform associated work.
10. Temporary bypass pumps shall remain setup on site and ready for immediate operation until the station has successfully operated for 14 consecutive days without fault after improvements are made.

1.14. REQUESTS TO WORK OUTSIDE OF NORMAL WORKING HOURS

- A. Submit requests to work outside normal working hours at least one week in advance. Requests to work outside normal working hours must be approved in advance by Owner and Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Definitions.
- B. Schedule of Values.
- C. Application for Payment.
- D. Change procedures.
- E. Alternates.
- F. Safety and Health.
- G. Standard forms.
- H. American Iron and Steel requirements.

1.02 DEFINITIONS

- A. Mobilization - Mobilization includes, but is not limited to, performance of preparatory construction operations, including the movement of personnel and equipment to the Project Site; application, fee payment, and acquisition of all required permits (i.e. erosion and sediment control plans, temporary and permanent building and trade permits); preparation of Progress Schedule; utility connections, etc.; insurance and bonds; and the establishment of Engineer's and Contractor's offices, buildings, and other facilities required at the Site in order to begin work on a substantial phase of the Contract.

1.03 SCHEDULE OF VALUES

- A. Submit three hard copies of Schedule of Values, provided on the attached EJCDC Form 620, and one electronic copy in Microsoft Excel of Schedule of Values in accordance with the timeframes identified in General and Supplemental Conditions.
- B. Line items shall be subdivided into the Bid Items shown on the Bid Form.
- C. The sum of all line items in the Schedule of Values shall equal the Total Bid Price included on the Bid Form.
- D. Each line item shall include a directly proportional amount of the Contractor's overhead and profit.
- E. Schedule of Values shall serve as a breakdown of Work used to establish progress payments. Progress payments for lump sum items will be made based on the percentages of completion of the work items included in the Schedule of Values for each lump sum item. Progress payments for Unit Price Work will be based on actual quantities of work performed. Progress payments for Contingent Unit Price work will only be made if work is authorized by

Owner and/Engineer. Progress payments for allowances will be made as described elsewhere in the Contract Documents.

- F. For Lump Sum Bid Items, the following format shall be followed when developing the Schedule of Values.
1. Mobilization shall be identified in the Bid Form as included in the respective Bid Item.
 - a. Lump sum line item shall include all work described in the definition of mobilization included herein.
 - b. Costs for bonds and insurance shall be included in the lump sum mobilization line item.
 2. Include separate line items for demobilization and contract closeout.
 3. Site work shall be subdivided into itemized quantities and unit costs for all individual construction components.
 - a. Include erosion and sediment control under site work.
 - b. Include site restoration.
 - c. Include yard piping.
 4. Revise Schedule of Values to include executed Change Orders with each Application for Payment. List each Proposed Change Order (PCO) that is incorporated into executed Change Orders.

1.04 APPLICATIONS FOR PAYMENT

- A. Submit six original signature versions of each application on forms furnished by Engineer. The forms shall include an additional statement above the Contractor signature stating as follows: "Contractor certifies that all materials that are part of this pay request meet the American Iron and Steel requirements in full."
- B. Contractor must have all record documents as identified in General Conditions Article 6.12 current and up to date prior to submitting Applications for Payment.
- C. With the draft application for payment, the following shall be provided. Engineer will not approve pay application without the following documentations:
 1. Required documents and Contractor's back-up data, including updated Schedule and all invoices for stored materials.
 2. Verification that all certified payrolls for Contractor and all subcontractors through the "period ending date" in the pay application shall be current and are being submitted as required by federal and state requirements including Davis Bacon requirements.
 3. Up-to-date monthly progress photos and as-built/record drawings.
- D. Engineer shall have a minimum of five working days after the "period ending date" to approve draft application for payments.

1.05 INFORMATION REQUESTS

- A. Contractor shall present questions regarding the Contract intent or interpretation to the Engineer via a Request for Information (RFI) form. Responses to the Contractor's questions will be provided on this same form.
- B. Contractor may propose changes by submitting an RFI including a request for change to Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation.

1.06 CHANGE PROCEDURES

- A. Change procedures shall be per M.G.L. and these Contract Documents.
- B. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Times by issuing supplemental instructions in a Field Order, as provided in Paragraph 9.04 of the General Conditions.
- C. The Engineer may issue a Proposal Request or Notice of Change through an Engineer's RFI, which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit an estimate within 14 calendar days of receiving the request or as specified in the General and Supplementary Conditions.
- D. The Contractor may propose changes by submitting an RFI including a request for change to the Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other subcontractors. Document any requested substitutions in accordance with Section 01600.
- E. Work Change Directive - Engineer may issue a directive, on EJCDC C-940 Work Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Price or Contract Time. Promptly execute the change.
- F. Lump Sum/Price Change Order - Based on Proposal Request or Notice of Change and Contractor's fixed or estimated price quotation.
- G. Unit Price Change Order - For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not predetermined, execute Work under a Work Change Directive. Changes in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.
- H. Time and Material Change Order - Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.
- I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes; and to substantiate costs for changes in the Work.

- J. Change Orders shall be executed on the DEP Change Order Form (sample attached at the end of this section).
- K. Execution of Change Orders - Engineer will issue Change Orders for signatures of parties in the following order: Engineer, Contractor, Owner.

1.07 ALTERNATES

- A. Bid alternates identified on the Bid Form will be reviewed and accepted or rejected at the Owner's discretion prior to execution of the Agreement. Accepted Alternates will be identified in the Agreement and included in the Work.

1.08 SAFETY AND HEALTH

- A. These construction documents and the construction hereby contemplated are to be governed, at all times, by applicable provisions of the Federal Law(s) including, but not limited to, the latest amendments of the following:
 - 1. Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596.
 - 2. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Requirements.
 - 3. Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.
 - 4. Part 1910 - Safety and Health Regulations for Construction, Chapter VII of Title 29, Confined Space Entry and Permits as amended.
- B. This project is subject to all of the safety and health regulations (see 29 CFR 1926, as amended) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to make themselves familiar with the requirements of these regulations.
- C. Contractor shall designate a Health & Safety Officer (with the appropriate training and certification) and shall prepare a Health and Safety Plan and make it available on-site for his employees. Neither the Owner nor the Engineer shall formally review the Contractor's Health and Safety Plan, but Contractor shall present the plan if Owner or Engineer so requests.

1.09 STANDARD FORMS

- A. Use standard forms attached to this section.

1.10 TERMS

- A. Throughout these Contract Documents, reference is made to certain trades, subcontractors, and contractors preceded by a descriptive term such as "Electrical." All such terms shall refer to the respective filed sub-bid subcontractor when used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

Section 01019, Contract Considerations

Attachments

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): <p style="text-align: center;">Town of Wareham, MA</p>	From (Contractor):	Via (Engineer): <p style="text-align: center;">GHD Inc.</p>
Project: Sewer Bypass Installations at Cohasset Narrows and Hynes Field Pumping Stations	Contract: Construction	
Owner's Contract No.: <p style="text-align: center;">2019-001</p>	Contractor's Project No.:	Engineer's Project No.: <p style="text-align: center;">11186079</p>

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	
<p>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.</p>	
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)

Endorsed by the Construction Specifications Institute.
 EJCDC C-620 Contractor's Application for Payment
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 This document has been modified from its original form as an EJCDC document.

Certificate of Substantial Completion

Project: Sewer Bypass Installations at Cohasset Narrows and Hynes Field Pumping Stations

Owner: Town of Wareham, MA	Owner's Contract No.: 2019-001
Contract: Construction	Engineer's Project No.: 11186079

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

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

Date of Substantial Completion

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

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

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

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

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

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

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

Field Order No. _____

Date of Issuance: _____ Effective Date: _____

Project: Generator Replacement at Salt Works Road and Terry Lane Pump Stations	Owner: Town of Wareham, MA	Owner's Contract No.: 2020-WW-01
Contract: Construction	Date of Contract:	
Contractor:	Engineer's Project No.: 11206153	

Attention:

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

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

Description: _____

Attachments: _____

cc:	Engineer:
	Name Title
Receipt Acknowledged by Contractor:	Date:

Copy to Owner

Work Change Directive
No. _____

Date of Issuance: _____ Effective Date: _____

Project: Generator Replacement at Salt Works Road and Terry Lane Pump Stations	Owner: Town of Wareham, MA	Owner's Contract No.: 2020-WW-01
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 11206153

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

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

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

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ days (increase/decrease)

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

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

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

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

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

\$ _____

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

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

CHANGE IN CONTRACT TIMES:

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

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

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

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

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

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

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

B. COMPLETING THE CHANGE ORDER FORM

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

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

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

SECTION 01026

LUMP SUM ITEMS
(BID ITEM DESCRIPTIONS)

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Price make-up.
- B. Elements of Bid Item Description page.
- C. List of lump sum items.
- D. Bid Item Descriptions - Attached pages.

1.02. PRICE MAKE-UP

- A. Lump sum prices bid by Contractor are deemed to be full compensation for all required labor, products, tools, equipment, plant, transportation, testing, inspection, services, incidentals, administrative procedures, applicable taxes, permit fees, overhead, profit, and other miscellaneous expenses.

1.03. ELEMENTS OF BID ITEM DESCRIPTION PAGE

- A. Identification of lump sum item, as set forth in the Bid Form.
- B. Brief statement of work involved in the item.
- C. Listing of components of work which make-up the item including reference to the Section(s) covering each component.
- D. Cross-references to associated work not included in the item.

1.04. LIST OF LUMP SUM ITEMS - CONTRACT NO. 2020-WW-01 - GENERATOR REPLACEMENT AT SALT WORKS ROAD AND TERRY LANE PUMP STATIONS

Bid Item No. and Title		Bid Item Description Number
1	Mobilization	B-1
2	Generator and Structure at Salt Works Road Station	B-2
3	Generator and Structure at Terry Lane Station	B-3
FILED SUB-BIDS		
F-1	Miscellaneous and Ornamental Iron at Salt Works Road Station	BF-1A
F-1	Miscellaneous and Ornamental Iron at Terry Lane Station	BF-1B
F-2	Electrical at Salt Works Road Station	BF-2A
F-2	Electrical at Terry Lane Station	BF-2B

1.05. BID ITEM DESCRIPTIONS

- A. Bid Item Description pages are attached at the end of this Specification section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

BID ITEM DESCRIPTION

BI-1

LUMP SUM ITEM

BID ITEM 1

MOBILIZATION

- A. DESCRIPTION Under this item, furnish all materials, labor, tools, and construct the work as called for in the Contract Documents and as outlined below.
- B. WORK INCLUDED UNDER THIS ITEM Mobilization
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM All other Bid Items.
- D. METHOD OF PAYMENT Payment for this Item shall be limited to 5 percent of the total amount Bid Items B-2 and B-3. One half of the amount bid will be paid with the first pay application and the remainder paid when Contractor is operational on-site or with the second pay application, whichever comes last.
Payment for mobilization shall be payable when the contractor is operational on the site. For purposes of this policy, "operational" shall mean the substantial commencement of work on site.

BID ITEM DESCRIPTION

BI-2 and BI-3

LUMP SUM ITEM

BID ITEM B-2 and B-3

Generator and Structure at Salt Works Road Station

A. DESCRIPTION

Under this Item, furnish all materials, labor, and equipment to construct the complete generator installation at the Salt Works Pumping Station as called for in the Contract Documents and as outlined below.

B. WORK INCLUDED UNDER THIS ITEM

Work not included under other bid items including, but not limited to:

- Mobilization
- Demobilization with the exception of demolition specifically assigned to the Electrical Filed Subcontractor
- Insurance and Bonds (General and Supplementary Conditions)
- Summary of Work
- Contract Considerations
- Coordination
- Submittals
- Construction Documentation
- Quality Control
- Temporary Facilities
- Erosion Control
- Materials and Equipment
- Record Documents
- Demolition
- Site Clearing
- Protection of Existing Facilities
- Excavating
- Backfilling
- Compaction
- Segmental Retaining Walls
- Site Rehabilitation
- Concrete
- Structural Steel
- Steel Deck
- Metal Fabrications except as relates to pipe and tube railings and ladders, and bollards
- Post-Installed Concrete and Masonry Anchors except as relates to pipe and tube railings and ladders, and bollards.
- FRP Grating
- All applicable construction details.
- All Contract Drawings Not Included in the Scope of Other Bid Items
- Earthwork, concrete, and demolition work in accordance with Division 2 and Division 3 in order to accommodate electrical work as detailed on the Electrical (E) drawings.

C. ASSOCIATED WORK
NOT INCLUDED
UNDER THIS ITEM

All other Bid Items

D. METHOD OF PAYMENT

Payment will be made on a lump sum basis in accordance with the Contractor's Schedule of Values which shall include, as a minimum, all items listed herein under "B" broken down into sufficient detail for Engineer to adequately review progress payment amounts. Refer to Section 01019 for details.

BI-2 IS FOR WORK ASSOCIATED WITH THE SALT WORKS ROAD PUMP STATION

BI-3 IS FOR WORK ASSOCIATED WITH THE TERRY LANE PUMP STATION

BID ITEM DESCRIPTION

F-1

LUMP SUM ITEM

BID ITEM F-1A and F-1B

MISCELLANEOUS AND ORNAMENTAL IRON

- | | |
|---|--|
| A. DESCRIPTION | A subcontractor may file a sub-bid for this item. Under this item, the subcontractor shall provide iron work as detailed below. |
| B. WORK INCLUDED UNDER THIS ITEM | See Section 05001 Paragraph 1.01 for a complete list of specifications and drawings. |
| C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM | All other Bid Items. |
| D. METHOD OF PAYMENT | Payment will be made on a lump sum basis in accordance with the Contractor's Schedule of Values, which shall include, as a minimum, all items listed herein under "B" broken down into sufficient detail for Engineer to adequately review progress payment amounts. Refer to Section 01019 for details. |

F-1A IS FOR WORK ASSOCIATED WITH THE SALT WORKS ROAD PUMP STATION

F-1B IS FOR WORK ASSOCIATED WITH THE TERRY LANE PUMP STATION

LUMP SUM ITEM

BID ITEM F-2A and F-2B

ELECTRICAL

- A. DESCRIPTION
A subcontractor may file a sub-bid for this item. Under this item, the subcontractor shall provide electrical and instrumentation work as detailed below.
- B. WORK INCLUDED UNDER THIS ITEM
See Section 16001 Paragraph 1.01 for a complete list of specifications and drawings.
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM
All other Bid Items.
- D. METHOD OF PAYMENT
Payment will be made on a lump sum basis in accordance with the Contractor's Schedule of Values, which shall include, as a minimum, all items listed herein under "B" broken down into sufficient detail for Engineer to adequately review progress payment amounts. Refer to Section 01019 for details.

F-2A IS FOR WORK ASSOCIATED WITH THE SALT WORKS ROAD PUMP STATION

F-2B IS FOR WORK ASSOCIATED WITH THE TERRY LANE PUMP STATION

SECTION 01039

COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination.
- B. Field engineering.
- C. Preconstruction conference.
- D. Site mobilization conference.
- E. Progress meetings.
- F. Preinstallation conferences.
- G. Start-up conference.
- H. Electronic communication requirements.

1.02 COORDINATION

- A. Coordinate scheduled work sequences and related operations beforehand with appropriate local, county, or state officials and agencies including affected property owners, when Project is to be located in or adjacent to a public right-of-way.
- B. Coordinate scheduling, submittals, and Work of the various Specification sections to assure efficient and orderly sequence of installation of interdependent construction elements.
- C. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.
- F. After Owner use of facilities, coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- G. It is the General Contractor's responsibility to coordinate all Work on the project. When work involving interaction of more than one filed sub-bid contractor is shown, it is the General Contractor's responsibility to coordinate all work and to identify conflicts before materials are ordered. As a minimum, the following shall be adhered to with regard to coordination of all work:

1. Services shall not be installed in such a way as to interfere with, inhibit, or prevent access to anything or any areas.
2. All equipment must be accessible to be serviceable without any obstructions from all directions recommended by manufacturer as being required for such maintenance, but in no event shall it be any less than one direction.
3. All equipment shall be able to be removed in the most accessible plane without having to maneuver around other equipment.
4. There shall be no obstructions in front of any devices that may either adversely impact the life of the obstruction or inhibit needed access by the end user.

1.03 FIELD ENGINEERING

- A. The Contractor shall provide field surveying and field engineering services for work required in execution of the work and for preparation of the Project Record Documents.
- B. The Contractor shall employ a Professional Land Surveyor licensed in the Commonwealth of Massachusetts.
- C. Existing basic horizontal and vertical control datum is shown on the Drawings. The Contractor's Professional Land Surveyor shall verify all control data at the beginning of the work and prior to construction, and shall report any discrepancies to the Engineer. After coordination with the Engineer, the Professional Land Surveyor shall correct any discrepancies. A copy of the final control datum survey shall be submitted to the Engineer for the record.
- D. The Contractor and his Professional Land Surveyor shall locate and protect control monuments prior to starting the Work. The Contractor shall protect all control monuments during construction. Should a control monument be destroyed or moved, the Contractor's Professional Land Surveyor shall replace the control monument. The Contractor shall submit new coordinates and elevation data for replaced control monuments to the Engineer for the record.
- E. The Contractor shall provide correct lines, grades, locations, and elevations for construction of all Project components.
- F. The Contractor and his Professional Land Surveyor shall provide correct information for the preparation of Project Record Documents.
- G. The Contractor shall submit a copy of the record site drawings, certified by the Professional Land Surveyor who provided field engineering services, stating that the locations and elevations of the Work are in conformance with the Contract Documents.
- H. The Engineer reserves the right to inspect or check results of the Contractor's field engineering services specified herein for conformance with the Contract Documents.

1.04 PRECONSTRUCTION CONFERENCE

- A. Engineer will schedule a conference after the Effective Date of Agreement.
- B. Attendance Required - Owner, Engineer, and Contractor.

C. Agenda

1. Distribution of extra sets of Contract Documents.
2. Submission of list of Subcontractors, list of products, Schedule of Submittals, Schedule of Values, and Progress Schedule.
3. Designation of personnel representing the parties in Contract and Engineer.
4. Procedures and processing of field decisions, submittals, substitutions, Applications for Payments, proposal requests, Change Orders, and Contract closeout procedures.
5. Scheduling.
6. Scheduling activities of testing laboratory and procedures for testing.
7. Requirements of regulatory agencies.
8. Use of premises by Owner and Contractor.
9. Temporary facilities to be provided by Owner and by Contractor.
10. Security and housekeeping procedures.
11. Procedures for maintaining record documents and progress photos.
12. Maintenance of vehicular traffic.
13. Periodic cleanup of Site.
14. Notification of utilities' owners.
15. Equipment startup.

- D. Engineer will record minutes and distribute copies after meeting to participants and to those affected by decisions made.

1.05 SITE MOBILIZATION CONFERENCE

- A. Engineer will schedule a conference at the Project site prior to Contractor occupancy. This meeting may be combined with the preconstruction conference.
- B. Attendance Required - Owner, Engineer, Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda
1. Use of premises by Owner and Contractor.
 2. Owner's requirements and partial occupancy.
 3. Temporary utilities.
 4. Survey and facility layout.

5. Security and housekeeping procedures.
 6. Schedule.
 7. Procedures for testing / Contractor's testing plan.
 8. Procedures for maintaining record documents.
 9. Requirements for start-up of equipment.
 10. Inspection and acceptance of equipment put into service during construction period.
 11. Material safety data sheet files – notification of location.
- D. Engineer will record minutes and distribute copies after meeting to participants and to those affected by decisions made.

1.06 PROGRESS MEETINGS

- A. Engineer will schedule and administer meetings throughout progress of the Work at minimum monthly intervals.
- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants and those affected by decisions made.
- C. Attendance Required - Owner, Engineer, Job superintendent, Contractor's project manager, major Subcontractors and Suppliers, as appropriate to agenda topics for each meeting.
- D. Agenda
1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems which impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of off-site fabrication and delivery schedules.
 7. Maintenance of Progress Schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on Progress Schedule and coordination.

13. Other business relating to Work.

1.07 PREINSTALLATION CONFERENCES

- A. When required in individual specification Section or requested by Engineer or Contractor, General Contractor shall convene a preinstallation conference at work site prior to commencing work of the Section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Notify Engineer four days in advance of meeting date. Engineer shall prepare agenda, preside at conference, record minutes, and distribute copies after conference to participants.
- D. Meeting shall review conditions of installation, preparation and installation procedures, and coordination with related work.

1.08 START-UP CONFERENCE

- A. Engineer will schedule a coordinating conference at least 14 days prior to anticipated startup date.
- B. Attendance Required - Owner, Engineer, plant operator, special consultants, Contractor, and job superintendent.
- C. Agenda
 - 1. Determine status of equipment.
 - 2. Ascertain presence of materials required to be at site for startup procedure.
 - 3. Review responsibilities of Owner and Contractors.
 - 4. Establish startup procedure; develop schedule(s) when appropriate.
 - 5. General coordination of all aspects of startup and initial operation.
- D. Engineer will record minutes of meeting and distribute copies to participants.

1.09 ELECTRONIC COMMUNICATION REQUIREMENTS

- A. Contractor shall submit the items subsequently described herein. Detailed procedures will be discussed during the Preconstruction Conference.
 - 1. Submittals - In addition to the hard copy Shop Drawing requirements specified under Section 01300, Submittals, submit each Shop Drawings in electronic format via email. This is required for submittals requiring review including but not limited to shop drawings, O&M Manuals, and paperwork associated with required Samples. The electronic copy of the Shop Drawing shall be in .PDF format. This procedure must be complete prior to sending hard copies.
 - 2. Requests for Information (RFI)
 - a. Submit each RFI in electronic format via email. The electronic copy of the RFI shall be in Microsoft Word format.

- b. Use RFI form attached to Section 01019.
 - 3. Proposed Change Orders - In addition to the hard copy, submit each Proposed Change Order in electronic format via email. The electronic copy of the Proposed Change order shall be in .PDF format. This procedure must be complete prior to sending hard copies.
- B. Submit all letters and memorandums not related to items previously described in this Article in .PDF form via email.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Review of submittals.
- C. Schedule of submittals.
- D. Construction progress schedules.
- E. Proposed products list.
- F. Shop drawings.
- G. Product data.
- H. Samples.
- I. Manufacturer's instructions.
- J. Manufacturer's certification.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each required submittal in hard copy and electronic form using an Engineer accepted form.
- B. Number the submittals as follows:
 - 1. First: Specification section number.
 - 2. Submittal number within the Specification section.
 - 3. Review cycle number.
 - 4. Title of submittal.
 - 5. For example:
 - a. 15060-01-01 – Field lock gaskets for DIP (first review cycle)
 - b. 15060-01-02 - Field lock gaskets for DIP (second review cycle)
 - c. 15060-02-01 – Flange pipe and fittings (first review cycle)
 - d. 15060-02-02 – Flange pipe and fittings (second review cycle)
 - e. 15060-02-03 – Flange pipe and fittings (third review cycle)

- C. Identify Project, Contractor, Subcontractor, and Supplier; pertinent Drawing number and detail number(s), and Specification sections, as appropriate.
- D. Apply stamp, signed or initialed providing certification required by General Condition Article 6.17.C.2. At a minimum, stamp shall include the following information:
1. Submittal Number _____
 2. Deviations: None _____; As Listed _____
 3. Reference Specification Section _____
 4. Reference Drawing Number _____
 5. Space Requirement: As Designed _____ Different, As Listed _____
 6. Representation is made to Owner and Engineer that Contractor has satisfied the requirements of General Conditions Article 6.17.C.1.a through d and that the Contractor hereby approves this submittal.
Contractor _____
Signature _____
Date _____
Date _____

NOTE TO CONTRACTOR: All line numbers must be filled out (those lines with multiple options require only one of the options to be filled out). Failure to complete all the lines or to complete the lines below the certification statement will result in the return of the unreviewed shop drawing submittal.

- E. Schedule submittals to expedite the Project, and deliver to parties in the quantities specified in this Section and at the locations identified during the Preconstruction Conference.
- F. Identify deviations from Contract Documents in accordance with General Conditions Article 6.17.C.3.
- G. Identify product and/or system limitations which may be detrimental to successful performance of the completed Work.
- H. Identify space requirements which differ from those designed and/or shown on the Contract Documents.
- I. Provide space for Contractor Accepted review stamps.
- J. Revise and resubmit in accordance with General Conditions Article 6.17.E. Identify all changes made since previous submittal in a cover letter or memorandum.
- K. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- L. Submittals not required will not be recognized or processed.
- M. Items shall not be fabricated or delivered without fully accepted Shop Drawings.
- N. Ensure no associated work begins until associated Shop Drawings are fully accepted.
- O. Fabrication prior to receiving an "Accepted" or "Accepted as Corrected – No Resubmittal Required" is at Contractor's risk.

- P. All products provided by the Contractor or his subcontractors for the project requires a shop drawing submittal. This includes any products provided as part of change orders and products only shown on the Contract Drawings.
- Q. The Owner reserves the right to hold the Contractor responsible for the Engineer's costs to review more than two submittals (one resubmittal) on any one product.

1.03 REVIEW OF SUBMITTALS

- A. Review of submittals will be in accordance with General Conditions Article 6.17.D.
- B. Review Times
 - 1. No less than 30 days shall be allowed for Engineer's review of complete submittals and resubmittals unless otherwise specified in the Contract Documents.
- C. Review Codes
 - 1. Accepted
 - 2. Accepted as Corrected – No Resubmittal Required
 - 3. Accepted as Corrected – Resubmittal Required
 - 4. Accepted as Corrected – Resubmit Written Responses and Requested Information
 - 5. Revise and Resubmit
 - 6. Not Accepted
 - 7. Not Reviewed
 - 8. Informational Purposes Only
- D. Payment for items requiring resubmittals shall not be made in full (100 percent of the line item) until all submittals are coded Accepted or Accepted as Corrected – No Resubmittal Required.

1.04 SCHEDULE OF SUBMITTALS

- A. Submit three copies of preliminary Schedule of Submittals in accordance with General Conditions Article 2.05.
- B. The Schedule of Submittals shall be reviewed by the Engineer. Contractor shall revise and resubmit the schedule, if required, until acceptable to Engineer.

1.05 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit detailed baseline progress schedule within 00 days after date indicated in the Notice to Proceed for Engineer review.
- B. Submit monthly updates to construction progress schedules with each Application for Payment identifying changes since previous version.

1.06 SHOP DRAWINGS

- A. Provide information in accordance with General Conditions Article 6.17 as supplemented herein and as required by individual Specification sections.
- B. Shop Drawing submittals shall include all descriptive data, performance characteristics, material specifications, spare parts list, drawings, piping diagrams, wiring schematics, and shall be complete and accurate to indicate item-by-item compliance with the Contract Documents.
- C. Shop Drawings shall be drawn at scales matching those on the Drawings depicting the same items.
- D. All catalog cuts, manufacturer's specifications, drawings, and verbal descriptions shall be clearly marked to allow identification of the specific products used.
- E. If the submittal deviates from the requirements of the Specifications in any way, it shall be clearly marked in the submittal with the justifying reason stated for evaluation by Engineer.
- F. Electrical and control submittals shall include a verbal description of the functions, metering equipment, alarm points, alarm sequences, and any other specific features provided.
- G. Submit one electronic copy and four opaque reproductions to Engineer, three copies of which will be retained by the Engineer.
- H. The specifications contained in this set of Contract Documents have been specifically tailored to the needs of the project. The manufacturer's standard offering is only acceptable if it meets the requirements of the specifications in full.
- I. The Contractor shall adhere to all applicable requirements in "Related Sections". When conflicts are present, defer to the parent specification.
- J. When fewer than three named manufacturers appear in these specifications, it was done with Owner approval as required by Massachusetts General Law.

1.07 PRODUCT DATA

- A. Submit at least four copies to Engineer, three copies of which will be retained by the Engineer. The remainder will be returned to contractor. One electronic copy shall be submitted of each submittal and resubmittal.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.08 SAMPLES

- A. Provide in accordance with General Conditions Article 6.17 as supplemented herein and as required by individual Specification sections.
- B. Submit Samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

- C. Submit Samples of finishes in custom colors selected, textures, and patterns for Engineer's selection.
- D. Include identification on each Sample, with full Project information.
- E. Submit the number or samples specified in individual Specification sections; one of which will be retained by Engineer.
- F. Reviewed samples which may be used in the Work are indicated in individual Specification sections.

1.09 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, in quantities specified for Shop Drawings.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01380

CONSTRUCTION DOCUMENTATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Construction photographs.
- B. Construction videography.
- C. Reuse of construction documentation.

1.02. DESCRIPTION

- A. Contractor shall take construction record photographs and videography prior to mobilization and periodically during the course of the Work and following completion of construction.
- B. All videography shall be done by a professional videographer.
- C. All construction photography taken prior to construction and after construction (pre- and post-construction photography) shall be done by a professional photographer.
- D. It is understood that progress photos may be taken by the Contractor's forces in order to capture work progress and key underground facilities.

1.03. CONSTRUCTION PHOTOGRAPHS

- A. Digital construction photographs shall be captured at each of the major stages on construction listed below and shall be furnished to Engineer and Owner with each Application for Payment.
 - 1. Site before mobilization.
 - 2. Completion of underground facilities prior to backfilling.
 - 3. Completion of underground conduit and piping prior to backfilling.
 - 4. Photographs shall be taken of existing buried facilities (i.e., footings of existing structures) that are exposed by excavation).
 - 5. Photos of areas to be demolished with special consideration given to existing equipment designated to be removed and turned over to Owner.
 - 6. Completion of excavations for each structure.
 - 7. Completion of foundations of each structure.
 - 8. Completion of framing of each structure.
 - 9. Completion of enclosure for each structure.

10. Installation of all interior and exposed exterior piping, equipment, and electrical components.
 11. Testing of all piping, equipment, and systems.
 12. Completion of site restoration
- B. Views and Quantities Required
1. Two views of each item.
 2. At least five views of overall project progress monthly.
- C. Take aerial photographs of completed project.
- D. Camera used for digital photography shall be 10 megapixel or greater.
- E. Electronic Copies
1. Maintain database of images for the entire length of the Project.
 2. Each month, provide media (CD, thumbdrive, etc.) with electronic versions of all images captured in the past month.
 3. Provide media with electronic versions of all images captured in during the course of the Project (in .jpg format) with final Application for Payment.
 4. All electronic copies of photos shall be in .jpg format. All electronic copies of photos shall be arranged on media by date and subject / street location. Each .jpg photo file name shall include the subject description and date.

1.04. CONSTRUCTION VIDEOGRAPHY

- A. Digital video shall be made to document the condition of the Site, including the interior of all rooms in all structures and all exterior areas on the site, prior to mobilization and following completion of the project.
- B. Videos shall show the entire Site and sufficient detail to discern existing Site conditions and completed site conditions.
- C. Coverage shall include, but not be limited to, all existing roadways, building, structures, aboveground utilities, existing trees and shrubs, landscaping, and all other physical features located within the area bounded by the following: 20 feet outside of the edge of the Contract Limits.
- D. All taping shall be done during daylight hours and with adequate indoor light. No taping shall be done on days with rain, snow, fog, or any such conditions that degrade natural light.
- E. Video shall identify time and date electronically on each frame.
- F. Provide two DVDs of each video. Identify location, name of project, date, and time video was made. A chronological log of project areas videoed and their location (i.e., 1:23 to 2:45 inside/outside the following structures (names) on the DVD) shall be included with submission.

1.05. REUSE OF CONSTRUCTION DOCUMENTATION

- A. All construction documentation furnished to Owner shall become the property of the Owner and cannot be copyright or otherwise protected in a manner that prevents free reuse by either the Owner and/or Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. DELIVERY OF IMAGES

- A. Preconstruction images on CD/DVD shall accompany the first Application for Payment. This Application for Payment will not be approved without receipt of such materials.
- B. Monthly construction images on CD/DVD shall accompany each monthly Application for Payment. Monthly Applications for Payment will not be approved without receipt of such materials.
- C. Final construction images shall accompany the final Application for Payment. This Application for Payment will not be approved without receipt of such materials.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References and standards.
- C. Tolerances.
- D. Field samples.
- E. Mock-up.
- F. Inspection and testing services.
- G. Testing by Contractor.
- H. Manufacturers' field services and reports.

1.02. QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over Suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Verify that field measurements are as indicated on Shop Drawings and as instructed by the manufacturer.
- D. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Comply with specified standards as a minimum quality for the Work except when code requirements or equipment manufacturer requires more stringent standards.
- F. Perform Work by persons qualified to produce workmanship of specified quality.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.03. REFERENCES AND STANDARDS

- A. For products and workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified and/or are required by applicable codes.
- B. Obtain copies of standards where required by individual Specification sections.

- C. If specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.04. TOLERANCES

- A. Monitor fabrication and installation tolerance control to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. If manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.05. FIELD SAMPLES

- A. Furnish field Samples at the Site as required by individual Specification sections.
- B. Acceptable Samples represent a quality level for the Work.
- C. Where field Sample is specified in individual Specification sections to be removed, clear area after field Sample has been accepted by Engineer.

1.06. TESTS AND INSPECTIONS – CONTRACTOR PROVIDED

- A. Contractor shall employ and pay for the services of an independent testing laboratory to perform inspections, tests, and approvals. Testing is identified in but not limited to the following specifications:
 - 1. Section 02222 – EXCAVATING
 - 2. Section 02228 – COMPACTION
- B. Independent testing laboratory will:
 - 1. Perform inspections, tests, and other services specified in the individual specification sections.
 - 2. Perform inspecting, testing, and source quality control specified in the individual specification sections and which may occur on or off project site.
 - 3. Prepare and submit reports to the Contractor and the Engineer, concurrently, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- C. Contractor shall:
 - 1. Cooperate with independent firm; furnish samples of materials; furnish design mix, equipment, tools, storage, and assistance as requested.
 - 2. Coordinate services of independent testing firm.
 - 3. Provide 24-hour notice to Engineer's RPR of when testing firm will be on-site.

- D. Retesting required because of non-conformance to specified requirements shall be performed, on instructions by the Engineer, by the same independent firm which performed the initial tests and inspections.

1.07. MANUFACTURERS' FIELD SERVICES

Not used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Continuity of service.
- B. Temporary Utilities.
- C. Temporary Controls.
- D. Construction Facilities.
- E. Field Offices.

1.02. CONTINUITY OF SERVICE

- A. Provide temporary equipment including pumps, piping, valves, bulkheads, electrical equipment, and all system components necessary to maintain the existing facilities in service during construction.
- B. Provide temporary power, instrumentation, controls, and alarms necessary to assure continued facilities operation during the alterations of existing facilities components or installation of new equipment.
- C. Maintain emergency backup power supply to all equipment determined by Owner's to be essential to facilities operation. Provide temporary emergency generator and electrical connections, if necessary. Equipment essential to facilities operations includes, but is not limited to, the following:
 - 1. Not Applicable
- D. Construction may require the closing of various gates and valves to isolate tanks, channels, and equipment. The Owner does not guarantee that the gates and valves will be completely water tight. It is the Contractor's responsibility to take whatever measures are necessary to proceed with construction in the event that valves or gates leak.
- E. Provide temporary access required, including ladders, platforms, grating, and walkways; all which comply with OSHA laws, for necessary facilities operations.
- F. No extra payment shall be made for any labor, materials, tools, equipment, or temporary facilities required during construction. All costs therefore shall be considered to have been included in the Bid.

1.03. TEMPORARY ELECTRICITY

- A. Contractor shall provide and pay for power service required from utility source for Contractor operations and those of his subcontractors, including equipment, job trailers, etc.
- B. Contractor's power consumption shall not disrupt Owner's need for continuous service.

- C. Contractor shall provide all fuel for temporary power generation equipment.
- D. Permanent convenience receptacles may not be used during construction.

1.04. TEMPORARY LIGHTING

- A. Provide and maintain lighting for Contractor operations and those of all subcontractors to achieve:
 - 1. A minimum lighting level of 2 watt/sq. ft. for construction operations.
 - 2. 1 watt/sq. ft. lighting to exterior staging and storage areas after dark for security purposes.
 - 3. 0.25 watt/sq. ft. H.I.D. lighting to interior work areas after dark for security purposes.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtailed, and lamps as required, for Contractor's operations and those of all subcontractors.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be used during construction within the existing buildings. However lighting levels are not guaranteed to provide the required lighting for construction activities.

1.05. TEMPORARY WATER SERVICE

- A. Contractor shall provide sufficient potable quality drinking water for its employees at the Project Site. Potable water for drinking purposes shall not be provided by the Owner.

1.06. TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide and maintain required sanitary facilities and enclosures for use by all persons employed at the Site. Provide at time of mobilization.
- B. Contractor shall remove facilities from site at end of construction.
- C. Facilities shall be maintained in conformance with applicable State Regulations and Local ordinances. Contents shall be removed and disposed of in satisfactory manner by Contractor as occasion requires.

1.07. BARRIERS

- A. Contractor shall provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
- C. Provide protection for plant life designated to remain. Replace damaged plant life.
- D. Protect vehicles, stored materials, Site, and structures from damage.

- E. Supplement barriers with suitable signs, railings, and night lights, as necessary to conform to governing authorities and regulations.

1.08. FENCING

- A. Construction fencing to be commercial-grade chain link fence.

1.09. WATER CONTROL

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect Site from puddling or running water. Provide water barriers as required to protect site from soil erosion as specified in Section 01564, Erosion Control.
- C. Follow requirements of Contract Documents for sediment and erosion controls.
- D. All operations and sediment erosion controls shall utilize best management practices as defined in federal, state, and local guidelines and regulations.
- E. All existing and new drainage shall be flushed and all catch basins and sediment control traps shall be cleaned by Contractor prior to final payment.

1.10. EXTERIOR ENCLOSURES

- A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- B. Provide weather-tight heated enclosures for all stored equipment in accordance with Section 01600, Materials and Equipment.

1.11. INTERIOR ENCLOSURES

- A. Contractor shall provide temporary partitions and ceilings as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1.12. PROTECTION OF INSTALLED WORK

- A. Protect installed Work from damage and deterioration due to construction activities, traffic, birds, pests, vermin, wild-life, pets, pedestrians, visitors, vandals, dust, vapors, floods, precipitation, driving rain, wind, snow storms, melting temperatures, or freezing temperatures; provide special protection where specified in individual Specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic over landscaped areas. Provide adequate barriers, directional signs, and/or guards, if necessary to provide adequate protection of landscaped areas.
- G. Owner reserves right to order that additional protective measures be taken beyond those proposed by Contractor, to safeguard the existing facilities and Work at no additional cost to Owner.

1.13. SECURITY

- A. Contractor shall provide security and facilities to protect its Work, and that of subcontractors, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate security measures taken with Owner's own security program.

1.14. PARKING

- A. Contractor shall arrange for temporary surface parking areas to accommodate all construction personnel involved with Project.
- B. When Site space is not adequate, Contractor shall provide additional off-site parking.

1.15. PROGRESS CLEANING

- A. Contractor shall maintain areas free of waste materials, debris, and rubbish. Maintain Site and structures in a clean and orderly condition, as follows:
 - 1. Remove debris and rubbish from pipe chases, plenums, attics, crawlspaces, and other closed or remote spaces, prior to enclosing the space.
 - 2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - 3. Collect and remove waste materials, debris, and rubbish from Site weekly and dispose off-site.
- B. Contractor shall store unused tools and equipment at Contractor's yard or base of operations.

1.16. POLLUTION CONTROLS

- A. Dust Control
 - 1. Execute Work by methods to minimize raising dust from construction operations.
 - 2. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
 - 3. Wash down disturbed areas daily.
 - 4. Implement best management practices in accordance with requirements of agencies have jurisdiction over dust control.

- B. Erosion and sediment control shall be provided in accordance with the Contract Documents and the requirements of governing regulatory agencies.
 - 1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas.
 - 2. Minimize amount of bare soil exposed at one time.
 - 3. Provide temporary measures such as berms, dikes, and drains, to regulate water flow and prevent soil erosion.
 - 4. Periodically inspect earthwork in disturbed areas to detect evidence of erosion and sedimentation; promptly apply corrective measures.
 - 5. Implement best management practices in accordance with requirements of agencies have jurisdiction over erosion and sediment control.
- C. Noise Control
 - 1. All construction equipment and tools exhibiting potential noise nuisance shall be provided with noise muffling devices.
 - 2. Confine use of such equipment and tools between the hours of 7:00 a.m. and 3:00 p.m.
 - 3. Implement best management practices in accordance with requirements of agencies having jurisdiction over noise control.
- D. Pollutants Control - Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.17. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Contractor shall remove temporary utilities, equipment, facilities, controls, and materials prior to Final Application for Payment.
- B. Remove temporary barriers, enclosures, etc. in concert with completion of those segments of Work which no longer require such measures.
- C. Remove temporary underground installations to a minimum depth of 2 feet.
- D. Clean and repair damage caused by installation or use of temporary work.
- E. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.18. CONTRACTOR'S FIELD OFFICE

- A. If required for his own operations, Contractor shall provide weather-tight field office with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack, drawing display table, and filing cabinets for Contractor's use.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01564
EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of sedimentation and erosion control barriers.
- B. Anchoring all topsoil stockpiles with straw mulch and ringing with hay bales.
- C. Protection of catch basins with hay bale rings, silt fence, tubular sediment barrier or filter fabric bags.
- D. Inspection of all erosion measures after each rainfall and at least daily during prolonged rainfall.
- E. Repairing immediately any failed sedimentation and erosion control barrier.
- F. Removing and disposing sediment deposits in a manner that does not result in additional erosion or pollution.
- G. Removal of hay bales, silt fences, and other erosion control measures after completion of construction and permanent stabilization of erosion.
- H. Removal of sedimentation barriers after completion of construction.

1.02 RELATED SECTIONS

- A. Section 02222 – EXCAVATION
- B. Section 02223 – BACKFILLING
- C. Section 02228 – COMPACTION
- D. Section 02980 – SITE REHABILITATION

1.03 PERFORMANCE REQUIREMENTS

- A. Observe government policy established by United States Environmental Protection Agency (USEPA) and NPDES program requirements.
- B. Observe requirements set forth by the Federal Highway Administration FHWA-HI-095-038 "Geosynthetic Design and Construction Guidelines."
- C. Conform to all erosion and sedimentation control measures of the Commonwealth of Massachusetts.
- D. Temporary erosion and sediment control measures shall be installed as the first step in construction and shall not be removed until permanent cover is completely established and stabilized.

PART 2 MATERIAL AND PRODUCTS

2.01 MATERIALS

- A. Hay/Straw Bales - Shall be securely tied and measure 14 inches by 18 inches by 30 inches long or greater. Straw rolls may be used in lieu of bales.
- B. Tubular sediment control barriers (silt socks)
 - 1. Tubular sediment control barrier shall have a minimum diameter of 12 inches.
 - 2. Tubular sediment barriers shall be Filtrexx Silt Sock, Groundscapes Express FilterMitt, L&M Supply Company Silt Snake Compost Filter Sock, or approved equivalent.
 - 3. Tubes shall be burlap or approved biodegradable material.
 - 4. Organic matter content of filter media shall be between 20 and 100 percent (dry weight basis) as determined by ASTM D2974 (method A) Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
- C. Silt Fence with Woven Wire Mesh
 - 1. Hardwood stakes shall be a minimum 48 inch by 2 inch by 2 inch. Metal stakes shall be steel Type T or U. Stakes shall be spaced 8 to 10 feet apart for posts.
 - 2. Synthetic fabric 48 inches wide for fencing material.
 - a. Height - \pm 30 inches above ground.
 - b. Minimum 8" set in ground.
 - 3. Woven wire fence shall be 14.5 gauge with 6" mesh spacing, set 8" in ground.
- D. Stakes and Fasteners
 - 1. Shall be two #3 rebar or two 2-inch by 2-inch minimum hardwood stakes for each hay/straw bale.
 - 2. Shall be a minimum of 2-inch by 2-inch minimum by 48-inch hardwood post, or 48-inch long steel post for silt fences.
- E. Erosion Control Blanket - North American Green Type S150 or SC150, or approved equal shall be used.

2.02 PRODUCTS

- A. Sediment Barriers - Sediment barriers shall be hay or straw bales, stone, silt fences, or other approved materials that will prevent migration of silts and sediment to receiving waters.
- B. Mulch and Seeding - Mulch and seeding shall be in accordance with requirements of Tables 1 and 2 below and per the Contract Drawings.

TABLE 1

MULCH MATERIALS, RATES AND USES

MULCH MATERIAL	QUALITY STANDARDS	APPLICATION PER 1,000 SQ.FT.	RATES PER ACRE	DEPTHS OF APPLICATION
Straw or hay	Air-dried Free from coarse	75-100 lbs. 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75 to 90% of surface
Wood chips	Green or air-dried	500-900 lbs.	10-20 tons	2" - 7"

TABLE 2

TEMPORARY SEEDINGS FOR EROSION CONTROL OF CONSTRUCTION SITES

MULCH MATERIAL	QUALITY STANDARDS
Annual Rye Grass	10%
Creeping Red Fescue	35%
Little Bluestem	35%
Canada Wild Rye	10%
Perennial Rye Grass	10%

Apply temporary erosion control seed mix at a rate of 1 lb/1250 sf.

- C. Diversion Dikes - Diversion dikes shall be installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes.
- D. Interceptor Channels - Interceptor channels shall be installed across disturbed areas where the slope is running parallel to the direction of trenches.
- E. Trench Barriers - Trench barriers shall be used where the disturbed area is sloped in direction of the pipeline, when the slope exceeds 15 percent.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. General drawings do not show all of the necessary control measures to prevent erosion and sedimentation.
 - 1. The Drawing(s) only show several techniques such as silt fence and inlet protection details. There are a number of control techniques discussed in this Section that are considered acceptable.
 - 2. It is the Contractor's responsibility to design, implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.
 - 3. It is the Contractor's responsibility to install additional erosion control measures, including additional dewatering measures, as needed to prevent impacts to on or off-site water resources.

- B. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.
- C. All erosion and sedimentation control measures shall be inspected by the Contractor daily and immediately after periods of rainfall.
 - 1. Repair and/or maintenance of sedimentation and erosion control measures will be made as soon as needed.
 - 2. The Contractor will be held responsible for the implementation and maintenance of all control measures on this site.
- D. Land disturbance shall be kept to a minimum.
 - 1. Restabilization will be scheduled immediately after any disturbance.
- E. Silt fences, tubular sediment control or hay bales will be installed along the toe of all critical cut and fill slopes and for protection of resource areas.
- F. Catch basins will be protected with silt socks, silt fences, or hay bales throughout the construction sequence and until all disturbed areas are stabilized.
- G. Erosion and sedimentation control measures will be installed prior to all construction activities.
- H. Sediment removal from control structures shall be the responsibility of the Contractor.
 - 1. Sediment shall be disposed of in a manner which is consistent with overall intent of plan and which does not result in additional erosion.
- I. The erosion and sedimentation control measures described herein are intended as a general guide for the Contractor.
 - 1. It is the Contractor's responsibility to provide any and all work necessary to prevent erosion of soil from the construction site and to provide silt fences, hay bales or other control measures as the need arises during construction at no additional cost to Owner.
- J. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.

3.02 DIVERSION DIKES

- A. Diversion dikes shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the project area.
- B. Recommended Minimum Dimensions
 - Height - 1.5 feet
 - Top Width - 2 feet
 - Side Slopes - 2:1 or flatter
 - Material - Soil

3.03 DIVERSION CHANNELS

- A. Diversion channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.

- B. Diversion channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.
- C. Recommended Dimensions and Materials
 - Depth - 0.5 feet
 - Width - 2 to 4 feet
 - Side Slopes - 2:1 or flatter
 - Spacing - Where required
 - Material - Stable on-site material

3.04 TRENCH BARRIERS

- A. Trench barriers shall be used where the disturbed area is sloped in the direction of the pipeline, when the slope exceeds 15 percent.
- B. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of the sewer and prior to backfill, if backfill is delayed.
- C. Trench barriers shall act as an erosion check by preventing the washout of the trench.
- D. Recommended Dimensions and Materials
 - Height - To top of trench
 - Spacing - Approximately every 150 feet
 - Material - Earth-filled sacks or piled stones

3.05 SEDIMENT BARRIERS

- A. Sediment barriers shall be used at storm drain inlets; across minor swales and ditches; protection of resource areas and at other applications where the structure is of a temporary nature and structural strength is not required.
 - 1. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment on-site by retarding and filtering storm runoff.
- B. Barrier Types
 - 1. Hay or Straw Bales
 - a. Bales should be bound with twine.
 - b. Bales should be anchored to the ground with fence posts, wood pickets, or #3 rebar. Two anchors per bale are required.
 - c. Bales shall be installed so that runoff cannot escape freely under the bales.
 - d. Height - 1.5 feet
Width - 1.5 to 3.0 feet
Cross-Sectional Area Required Per Tributary Acre - 50 square feet

2. Stone
 - Height - 1.5 to 2.0 feet (uniform top elevation) top
 - Width - 3 to 5 feet
 - Side Slopes - 3:1 or flatter
 - Cross-Sectional Area Required Per Tributary Acre - 20 square feet
 - Material - Coarse rock or stone
3. Brush
 - a. Brush should be bound with twine.
 - b. Brush should be anchored such that it does not move and runoff cannot escape freely under the barrier.
 - c. Height - 1.5 to 2.0 feet
Cross-Sectional Area Required Per Tributary Acre - 15 square feet
4. Silt Fence - As specified in Part 2.
5. Tubular Sediment Barriers - As specified in Part 2.

3.06 MULCH

- A. Used alone or in conjunction with other structural or vegetative erosion control measure, mulch is applied on any disturbed area which is subject to erosion, for protection of disturbed soil or newly reseeded areas.

3.07 EROSION CONTROL BLANKET

- A. Erosion control blanket shall be used on slopes greater than 10 percent. Prior to installation of the erosion control blanket, the underlying layer is to be graded as shown on the Drawings.

3.08 VEGETATION

A. Temporary Vegetation

1. The planting of temporary vegetative cover shall be performed on disturbed areas where the earthmoving activities will be ceased for a period of more than 45 days.
 - a. The vegetation shall provide short-term rapid cover for the control of surface runoff and erosion, until permanent vegetation can be established or earthmoving activities can resume.
2. Table 2 gives recommended types of temporary vegetation, corresponding rates of applications, and planting seasons.
 - a. In situations where other cover is desired, the recommendations of the Owner and local Conservation Commission shall be followed.

B. Permanent Vegetation

1. Planting of various permanent vegetative covers shall be performed on disturbed areas where the earthmoving activities have ceased. The vegetation shall reestablish ground cover for the control of surface runoff and erosion.

2. The seed bed for permanent vegetative cover shall be prepared by using lime and fertilizer.
 - a. If the time of the seeding occurs during a dry period, mulch shall be applied to conserve soil moisture.
3. Permanent seeding shall be as shown on the Contract Drawings. Apply temporary erosion control seed mix at a rate of 1 lb/1250 sf.

3.09 SPECIAL CONDITIONS

- A. Prohibited Construction Practices - Prohibited construction practices include but shall not be limited to the following:
 1. Dumping of spoil material into any stream corridor, any wetlands or wetland buffer, any surface waters or at unspecified locations, even with permission of the property owner.
 2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
 3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
 4. Damaging vegetation adjacent to or outside of the access road or the right-of-way.
 5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
 6. Permanent or unspecified alteration of the flow line of the stream.
 7. Open burning of construction project debris.
- B. Defective Devices - Any erosion and sediment control devices which become damaged, clogged or otherwise non-functional shall be immediately replaced by the Contractor, without additional compensation.
- C. Adjustment
 1. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, the Contractor shall immediately adjust his program and/or institute additional measures so as to eliminate excessive erosion and sediment-runoff.
 2. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION

SECTION 01600
MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Products.
- B. Shipping and handling.
- C. Storage and protection.
- D. Substitutes and "or equals" items.

1.02. PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacturer, for components being replaced.

1.03. SHIPPING AND HANDLING

- A. Arrange deliveries in accordance with the Progress Schedule. Allow time for inspection prior to installation.
- B. Coordinate deliveries to avoid conflicts with Work, conditions at the Site, and availability of personnel and handling equipment.
- C. Transport by methods to avoid damage.
- D. Deliver in manufacturer's unopened containers or packaging, dry, with identifying labels intact and legible.
- E. Provide equipment and personnel for handling to prevent soiling and damage.
- F. Protect sensitive equipment and finishes against impact, abrasion, and other damage.
- G. Promptly inspect shipments to assure compliance with requirements, correct quantities, and identify damage.
- H. Provide Engineer with copies of all delivery invoices on the day of the delivery.

1.04. STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive items, including process mechanical, electrical, and heating and ventilating equipment, in weather-tight, climate controlled enclosures in an environment favorable to item. Enclosure shall be heated to maintain temperature above 50 degrees F and dehumidified to 30 percent relative humidity.

- B. For exterior storage of fabricated items, place on sloped supports, above ground.
- C. Provide bonded offsite storage and protection when storage and protection cannot be provided on Site.
- D. Cover items subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store items by methods that prevent soiling, disfigurement, and damage.
- G. Arrange storage to permit access for inspection. Periodically inspect to assure items are undamaged and are maintained in acceptable conditions.

1.05. SUBSTITUTES AND "OR EQUAL" ITEMS

- A. Engineer will consider requests for "Or Equal" items after the Effective Date of the Owner-Contractor Agreement, and then only within the time constraints stipulated in paragraph 6.05.A of the General Conditions.
- B. For substitute or "or equal" items, submit with shop drawings, a line-by-line comparison (according to specification article, paragraph, and subparagraph number) between the specified equipment item and the proposed equipment. Every requirement of the Drawings and specifications must be addressed in this comparison.
- C. Document each request with complete data substantiating compliance of proposed "or equal" with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Will provide the same warranty for the "or equal" item as for the 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 claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner the costs incurred by Owner for any subsequent redesign services by Engineer, including Engineer's revisions to the Contract Documents, and Engineer's assistance in connection with review by authorities when re-approval is required, if Engineer determines that the item of material or equipment proposed by Contractor is a "or equal" substitute item.
- E. "Or equal" or substitutions will not be considered when they are indicated or implied on shop drawing or Product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Limit each request to one proposed "or equal" item.

- G. Substitutes or "Or equal" items may be considered after the timeframe noted above when a Product becomes unavailable through no fault of the Contractor. Furnish evidence that Product is unavailable.
- H. Substitute or "Or equal" Submittal Procedure
1. Submit three hard copies and one electronic copy of requests for "or equal" to Engineer including all items required by General Conditions Article 6.05. Each submittal shall be provided with a transmittal letter stating "REQUEST FOR OR EQUAL SUBSTITUTION" or "REQUEST FOR SUBSTITUTE" and identifying the specific item for which the substitution is being requested. Submittal shall include shop drawings, product data, installation reference list (minimum of five with all necessary contact information), design computations by a qualified independent testing agency when required by Engineer, and certified test results attesting to the proposed Product equivalence.
 2. The Engineer will notify Contractor, in writing, of decision to accept or reject request. Engineer's decision is final.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700
RECORD DOCUMENTS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Closeout procedures.
- B. Record documents.

1.02. CLOSEOUT PROCEDURES

- A. Contract closeout procedures shall be in accordance with GC-14.07.

1.03. RECORD DOCUMENTS

- A. The following supplements the requirements of GC-6.12:
 - 1. Record, keep, and monitor up to date record documents of work constructed in the field. Legibly mark in red ink or red pencil to show all changes in, or directly associated with, the Work of this Contract. Keep entire set or record documents current on a day to day basis. Record documents shall be kept on hand in the Contractor's field office and shall be available for periodic examination by Engineer upon request.
 - 2. Examples of annotations that could occur are as follows:
 - a. Change in location or elevation of structures.
 - b. Change in dimensions of structures.
 - c. Elimination of structures.
 - d. Unforeseen modifications to existing structures.
 - e. Relocation of equipment.
 - f. Additions to or expansion of structures.
 - g. Changes in mechanical trades components (electrical, heating, ventilating, plumbing).
 - h. Measured location of internal utilities or mechanical trade items, which are to be concealed from view, referenced to visible and accessible features of the structure.
 - i. Change in location or elevations of Underground Facilities installed under this Contract.
 - j. Change in materials, such as pipe materials.
 - k. Relocation of existing Underground Facilities.

- I. Change in topographical contours of finished earth and paved surfaces.
 - m. Change in elevations of finished surfaces along route of installed Underground Facilities.
- 3. Show measurement of pipeline location from edge of pavement, at a minimum of 100-foot intervals.
- 4. Record Documents shall include the Certified Survey provided by the Contractor's Licensed Professional Land Surveyor in accordance with Section 01039-1.03.
- B. At Substantial Completion, affix Contractor's red identification stamp to front cover of each set of record documents and label them as "Record Documents". One hard copy and one electronic set of record documents shall be given to Engineer no later than 14 days after the date of Substantial Completion. Engineer will either approve record documents or return them to Contractor with comments. Contractor shall resubmit record documents until Engineer has no further comments. Affix Contractor's identification stamp, together with the label "Record Documents," as follows:
 - 1. On each Drawing, just above the Engineer's title block.
 - 2. On each Shop Drawing, just above the preparer's title block.
 - 3. On the front cover or front page of all other documents.
 - 4. Provide three (3) ties to permanent structures (such as building corners, catch basins, manholes etc.) for all installed bends, fittings and valves installed.
- C. Final payment to Contractor will not be considered until acceptable record documents have been turned over to Owner.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 02030

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition and removal of site-related construction.
- B. Demolition and removal of architectural construction.
- C. Demolition and removal of mechanical equipment and piping.
- D. Demolition and removal of electrical construction.
- E. Demolition and removal of HVAC construction.
- F. Demolition and removal of plumbing construction.

1.02 RELATED SECTIONS

- A. Section 01010 – SUMMARY OF WORK
- B. Section 01039 – COORDINATION
- C. Section 01300 – SUBMITTALS
- D. Section 01500 – TEMPORARY FACILITIES
- E. Section 01700 – RECORD DOCUMENTS
- F. Section 02110 – SITE CLEARING
- G. Section 02222 – EXCAVATING
- H. Section 02223 – BACKFILLING

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings
 - 1. At the request of the Engineer, submit proposed demolition plan together with any necessary diagrams and/or drawings, taking into account sequence of construction of the project. The plan shall be a comprehensive demolition and disposal plan that takes into consideration all materials that will be demolished and removed including, but not limited to: Section 02110 (Site Clearing), Section 02222 (Excavating), and Section 02223 (Backfilling).

2. Demolition plan shall include the following:
 - a. Demolition, removal, and disposition of items identified in this Section.
 - b. Disposal locations of removed items.
 - c. Relocation of salvageable items.
 - d. Plan to recycle materials that can be recycled.
 - e. Temporary storage of items to be reused.
 - f. Timelines and sequences of operations.
 - g. Location of temporary barricades, fences, and signs.
 - h. Provisions for disposal of sludge, grit, debris, and hazardous materials.
 - i. In addition, the plan will include:
 - i. The amount and types of construction and demolition debris and land clearing waste to be generated.
 - ii. Methods to handle materials classified as Waste Ban materials.
 - iii. Methods for separating, sorting, transporting, and disposing of any gypsum wall board separate from the rest of the solid waste stream.
 - iv. Methods for separating, sorting, transporting, and recycling or disposing of the remainder of the construction and demolition and land clearing wastes.

1.04 PROJECT RECORD DRAWINGS AND PHOTOGRAPHS

- A. Submit under provisions of Sections 01380 and 01700.
- B. Accurately record actual locations of capped utilities and subsurface obstructions.
- C. Contractor to take digital photographs of those items designated by the Owner, prior to their scheduled demolition, removal, or relocation.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for demolition of structures, protection of adjacent structures, dust control, runoff control, and disposal of materials.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting demolition operations and comply with their requirements.
- D. Do not close or obstruct access ways without written consent from the Owner.

- E. Conform to applicable regulatory procedures if a hazardous environmental condition is encountered at site or if hazardous material disposal is required.

1.06 SEQUENCING

- A. Sequence demolition work to conform with provisions of Section 01010.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ten days prior to performing any demolition, there shall be a coordination meeting between the Contractor, Owner, and Engineer to discuss the Contractor's Demolition Plan and related procedures. Items to be discussed shall be, but not limited to, dust control, sequence of work, removal of material, protection of existing equipment, access and egress of material, etc. Demolition procedures must be coordinated with the Owner's operating personnel and operations, and adjusted accordingly, if necessary.
 - 1. Following the coordination meeting, begin demolition operations after obtaining written authorization to proceed from the Owner.
- B. Notify Owner and Engineer at least 48 hours in advance of intended start of demolition operations in each affected area.
- C. Provide, erect, and maintain temporary barriers and signs at locations indicated on drawings and as described herein.
- D. Protect existing structures, equipment, appurtenances, architectural features, and materials which are not to be demolished. Prevent movement or settlement of adjacent structures.
- E. Protect existing site-related items such as pavements, walkways, parking areas, curbs, aprons, and landscaping features which are not to be demolished.
- F. Protect existing electrical; heating, ventilating, and air conditioning; and plumbing systems, including related components, which are not to be demolished.
- G. Mark location of underground utilities.

3.02 DEMOLITION REQUIREMENTS

- A. Confine demolition operations to designated areas of the site.
- B. Conduct operations to minimize interference with adjacent and occupied building areas. Maintain protected egress and access at all times.
- C. Cease operations immediately if adjacent structures appear to be in danger and notify Engineer immediately. Do not resume operations until directed by Owner or Owner's representative.

- D. Dispose of designated hazardous materials in accordance with the nature of the material, required handling and disposal procedures, regulatory requirements, and applicable local, state, and federal permits.

3.03 DEMOLITION

- A. Break up and remove slabs-on-grade, pavements, curbs, aprons, etc., and related items in designated areas.
- B. Backfill, compact, and rough grade areas excavated, including cavities created by removal of demolished items, in accordance with Section 02223 using fill material specified in PART 2.
- C. Disconnect, cap, and identify utilities within demolition areas.
- D. Plug openings in enclosures, walls and floors where utilities are removed. Disconnect and remove electrical component back to their source. Including concrete pads and supporting structures.
- E. Detach, dismantle, and remove metal components of process equipment from designated tanks, including miscellaneous metal work items associated with access to and operation of such equipment.
- F. Carefully disconnect, support, protect, and remove designated equipment to be reused on the Project or salvaged for Owner's future use.
- G. All removed materials and equipment designated for reuse on the Project, or salvaged for Owner's future use, shall be stored at locations within the Project Site and protected from damage and from deterioration by weather.
- H. Remove and dispose of demolished materials as work progresses. Do not burn materials; do not bury materials unless otherwise specified herein.
- I. Patch and refinish existing visible surfaces which are to remain in accordance with the Contract Specifications, and otherwise restore adjacent surfaces as specified herein.
- J. Remove temporary barricades, partitions, signs, etc.
- K. Remove and dispose of residual materials such as grit, sludge, debris, trash, and other scrap.
- L. Upon completion of demolition operations, leave areas in a clean condition.

3.04 SALVAGE

- A. It is the Owner's right to retain any existing component demolished or otherwise removed from the existing facility by the Contractor.
- B. Prior to beginning any demolition activities, the Contractor shall offer the Owner the opportunity to select any components identified in the Contract Documents for demolitions which the Owner would like to have salvages and turned over to the Owner rather than disposed of by the Contractor.
- C. The Contractor shall make every effort to remove components identified by the Owner for salvage without causing undue damage to the items beyond what could normally be anticipated in removing them from their current installation.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of surface debris, rubbish, snow, and water without unnecessary excavation of topsoil and subsoil.
- B. Removal of paving, curbs, and walks.
- C. Removal of trees, shrubs, and other plant life.
- D. Removal of stumps and root system of trees and shrubs.
- E. Disposal of excess materials, trash, and debris.
- F. Topsoil excavation and stockpile reusable topsoil for later use.

1.02 RELATED SECTIONS

- A. Section 01500 – TEMPORARY FACILITIES
- B. Section 01564 – EROSION CONTROL
- C. Section 02980 – SITE REHABILITATION

1.03 REGULATORY AND DISPOSAL REQUIREMENTS

- A. Coordinate clearing Work with utility companies.
- B. Conform to Town of Wareham, local, and state environmental requirements for disposal of debris and stockpiling.
- C. On-site disposal of surplus materials shall not be permitted. Contractor shall be responsible for disposal of all surplus materials not so identified in other sections as being the Owner's.
- D. Make all arrangements for disposal sites, unless the Owner designates special locations. All expenses for disposal shall be borne by the Contractor. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- E. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project Owner, and shall include any other conditions pertinent to the situation as agreed upon by each party. A copy of said agreement shall be furnished to the Owner.
- F. Follow standard horticultural practice for cutting and/or pruning of trees, brush, and shrubs.

1.04 SUBMITTALS

- A. Submit under provision of Section 01300.
- B. Shop Drawings
 - 1. Disposal agreement (per paragraph 1.03.D and E).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Not used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. Mark limits of clearing by flagging, fencing, or other approved methods.
- C. Vehicles used to haul soft or wet material over streets or pavements shall be sufficiently watertight to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles of the Contractor, he shall clean up the same, and keep the crosswalks, street, and pavements clean and free from debris.
- D. Identify on-site waste or salvage areas for placing removed materials.

3.02 PROTECTION

- A. Locate, identify, and protect existing utilities that are to remain, including notification of Underground Facilities Protection Organizations having jurisdiction in the geographic area, (Dig Safe System, Inc.).
- B. Install temporary fences (minimum 3 feet high) to protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- D. Where trees are to be protected or preserved, no excavation and grubbing, except as directly required for construction, shall be performed within the radius of spread of tree branches.
- E. No storage of topsoil materials or construction equipment will be permitted within the radius of spread of such tree branches.

3.03 CLEARING

- A. Clear areas required for access to site and execution of Work.

- B. Partially remove paving, curbs, and sidewalks as indicated. Neatly saw-cut edges at right angle to surface.
- C. Remove trees and shrubs as indicated. Remove stumps, main root ball, and root system to a depth of 36 inches.
- D. Clear undergrowth and deadwood, without disturbing subsoil.
- E. Apply herbicide to remaining stumps to inhibit growth.
- F. Remove debris, extracted rock, and plant life.
- G. Prune branches and/or roots of trees to be preserved or where they interfere with or obstruct construction operations.
 - 1. If exposed, bend and relocate main lateral roots and tap roots.
 - 2. Engage a state-certified arborist or qualified tree surgeon who shall cut roots and/or branches with sharp pruning instruments without breaking or chopping.
 - 3. Qualified personnel shall paint all cuts with standard tree paint or equivalent which is waterproof, antiseptic, elastic, and free of kerosene, coal, tar, creosote, and other harmful substances.
 - 4. Where required, extend pruning procedures to restore the natural shape of the entire tree or shrub.
- H. Damaged Trees - Vegetation which has been damaged by site clearing activities and deemed non-functional by the Owner or Engineer, shall be replaced by the Contractor with vegetation of the same genus and species at Contractor's expense.

3.04 DISPOSAL OF MATERIAL

- A. All material not used for the project or unless specifically called out in Contract Documents shall be treated as surplus material and disposed of off-site in a legal manner per Article 1.03.

3.05 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated and re-landscaped, without mixing with foreign materials.
- B. All topsoil, loam, or other natural organic materials covering such areas shall be removed; and when suitable for reuse as topsoil shall be stockpiled. Stockpiles shall be established only at approved locations and shall be maintained to prevent erosion and contamination until reuse. To prevent intermixing, topsoil shall not be stockpiled immediately adjacent to other stockpiled materials. All excavated materials shall be stockpiled at locations which will not create public endangerment or inconvenience. Stockpiles shall be kept clear of Fire Department and Police facilities and equipment and, where possible, clear of driveways, sidewalks, and crossings.
- C. Stockpile in area designated on-site to depth not exceeding 8 feet. Protect from erosion. Remove excess topsoil not being reused to a location designated by Owner.
- D. No topsoil shall be removed from the site without Owner's permission.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Location of facilities.
- B. Notification of owners and authorities.
- C. Coordination and preparation.
- D. Protection of facilities.
- E. Relocation of facilities.
- F. Protection of sewers and storm drains.
- G. Protection of water mains near sewers.
- H. Abandonment of utilities.
- I. Restoration of property markers.

1.02 RELATED SECTIONS

- A. Section 01039 – COORDINATION: Preconstruction meeting.
- B. Section 01300 – SUBMITTALS: Construction photographs.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 LOCATION OF FACILITIES

- A. Prior to construction, verify location of existing underground facilities near or adjacent to project.
 - 1. Consult with Dig Safe Systems, Inc. and arrange for field stake-out or other markings to show locations.
 - 2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.
- B. Report field stake-out findings and results of exploratory excavations to Engineer if possible changes in project location or design are indicated because of suspected interferences with

existing facilities. Allow Engineer sufficient time to determine magnitude of changes and to formulate instructions in that regard.

- C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02 NOTIFICATIONS OF OWNERS AND AUTHORITIES

- A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature, and planned progress schedule of the Work.
- B. Notify owners of nearby underground facilities when excavating or blasting is to take place in a particular area, allowing them reasonable time to institute precautionary procedures or preventive measures which they deem necessary for protection of their facilities.
- C. When existing utilities, such as sewer, water, gas, telephone, or electric power are damaged or disturbed during construction, immediately notify affected owner and Project Owner.
- D. Notify Water Department, Fire Department and all other water users affected by turning off of the water supply. Notification shall be delivered to affected water users a minimum of 24 hours prior to turning off the water supply. Notice shall be in a form acceptable to the Water Department. Service interruption should not exceed 4 hours unless otherwise agreed upon with the Owner and the affected property owner.
- E. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.03 COORDINATION AND PREPARATION

- A. Discuss anticipated work schedule with local authorities and owners of utilities at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted. Develop contingency plans to address Contractor's role in repair of damaged utilities.
- B. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.
- C. Adjust work schedules and personnel assignments as necessary to conform to requirements of utility owner whose utility is to be temporarily interrupted during construction. Cooperate with utility owner in this regard to minimize the time of interruption.
- D. Make preparations for and conform to applicable federal, state, and local regulations regarding use of proper safeguards and procedures when excavation and/or blasting is to take place in close proximity to existing facilities and structures.

3.04 PROTECTION OF FACILITIES

- A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the Work, including electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.

- B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.
- C. In locations where blasting is to take place, and in cooperation with owners of nearby facilities, provide special protection and support of underground facilities which may be vulnerable to damage by virtue of their physical location or condition, and which could create hazardous conditions if damaged.
- D. Existing utilities and other facilities which are damaged by the Contractor's construction operations shall be promptly repaired by Contractor to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at Contractor's expense.
- E. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify Engineer and consult with affected owner regarding temporary removal and later restoration of the interfering item. Arrange with that owner to remove and later restore the interfering item to the satisfaction of the owner, subject to approval of the project Owner; or, allow affected owner to perform such work with his own forces. Under either arrangement, such work shall be done at Contractor's expense.
- F. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to Owner.

3.05 RELOCATION OF FACILITIES

- A. If the location or position of an existing gas or water pipe, public or private sewer or drain, conduit or structure be such as, in the opinion of Engineer, to require its removal, realignment or change, such alteration shall be without cost to the Contractor for the work of removal, realignment or change only.
- B. Uncovering, supporting and sustaining such facility before its removal or before and after its realignment or change, shall be the Contractor's responsibility as part of the work of his Contract.
- C. Contractor shall be entitled to extension of time for completion of entire Work as the Engineer determines that the entire Work was delayed by the removal, realignment, or change of such obstruction.

3.06 PROTECTION OF SEWERS AND STORM DRAINS

- A. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or piping to maintain flow around that segment of the Work such that no back-ups occur in existing systems.
- B. Existing sanitary sewer laterals damaged in the work or temporarily disconnected shall be restored to operation by the end of each work day. Existing sanitary sewer laterals crossing over new pipelines to be restored in accordance with details shown on the Drawings.
- C. Maintain existing manholes, catch basins, and other utility structures in their pre-work condition. Any material or debris entering same due to the Contractor's operation shall be promptly removed.

3.07 PROTECTION OF WATER MAINS NEAR SEWERS

- A. Where a minimum 10-foot horizontal separation or minimum 18-inch vertical separation (bottom of water pipe to top of sewer pipe) cannot be maintained between a water main and sewer line, one or more of the following remedies shall be incorporated in the work:
 - 1. The sewer lines shall be encased in 4,000 psi mix concrete for a length of 10 feet on either side of the water main.
 - 2. Both the water main and sewer line shall be constructed of pressure type joints of ductile iron pipe, and shall be pressure tested to 100 psi to assure water-tightness.
 - 3. One full length of water main shall be centered over the sewer line, so that both joints will be as far from the sewer as possible.
 - 4. Relocate water main to obtain 18-inches minimum vertical separation.

3.08 ABANDONMENT OF UTILITIES

- A. Remove existing utilities to be abandoned within limits of trench excavation, or impinging on trench limits.
- B. Open ends of abandoned utilities, or those scheduled for abandonment, shall be bulkheaded by brick masonry or 4,000 psi mix concrete; or by cast iron plugs or caps in small diameter water mains.
- C. Abandoned sewers 36-inch diameter or larger shall be completely filled with sand or gravel or other approved material prior to bulkheading the open end(s).
- D. Abandoned manholes and water valve casings shall be backfilled to grade with approved trench backfill material.
- E. Frames, covers, grates, water valve casing, sections of water piping, hydrants (including standpipe and boot), valves and other items to be abandoned shall, if ordered by Owner, be salvaged for reuse and be delivered to Owner's property yard.

3.09 RESTORATION OF PROPERTY MARKERS

- A. Property corner markers, boundary monuments, etc., disturbed or moved by the Contractor's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the project Owner.

END OF SECTION

SECTION 02222

EXCAVATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation for building foundations.
- B. Excavation for slabs-on-grade, paving, and landscaping.
- C. Excavation for site structures.

1.02 RELATED SECTIONS

- A. Section 01400 – QUALITY CONTROL
- B. Section 01500 – TEMPORARY FACILITIES
- C. Section 01564 – EROSION CONTROL
- D. Section 02110 – SITE CLEARING
- E. Section 02205 – PROTECTION OF EXISTING FACILITIES
- F. Section 02223 – BACKFILLING

1.03 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum. Review subsurface report and other available site information.
- B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- C. Notify utility company to remove and relocate utilities.
- D. Protect above and below grade utilities which are to remain.
- E. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

- F. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- G. Excavations shall be in complete accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards. Contractor shall designate a "Competent Person" [29 CFR 1926.32(f)] who shall be responsible for inspections of excavations on a daily basis and document and maintain daily trenching and excavation logs per OSHA 29 CFR 1926.

3.02 CLASSIFICATION OF EXCAVATED MATERIAL

- A. Classifications of excavated materials are as follows:
 - 1. Unclassified Excavation - "Unclassified excavation" shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include "rock excavation" as well as "common excavation" as defined herein.
 - 2. Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as "common excavation."
 - 3. Rock Excavation - "Rock excavation" shall include all sound solid masses, layers and ledges of consolidated and indurated rock, or mineral matter of such hardness, durability, and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment. Should a conflict arise as to the classification of excavation as either "common" or "rock," the following test shall be used in the appropriate determination:
 - a. Where practicable, a late model tractor mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock."
 - b. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Engineer.
 - c. When rock is encountered in excavations, it shall be removed by rock hammering, jackhammering, or any other method suitable and safe considering the proximity of existing utilities or facilities. No blasting shall be permitted.
 - 4. For this project all excavated material shall be classified as unclassified excavation.

3.03 EXCAVATING

- A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving and site structures and construction operations.
- C. Excavate to working elevation for piling work. Coordinate special requirements for piling.
- D. Machine-slope banks to angle which is safe for specific material in which excavation is made.
- E. Excavation cut not to interfere with normal 45 degree bearing splay of foundation. Undercutting of excavation faces will not be permitted.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Hand trim excavation to required undisturbed subgrade. Remove loose matter.
- H. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with approved concrete or compacted gravel/crushed stone.
- I. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.
- J. Should the Contractor, through negligence or otherwise carry his excavation below the designated subgrade, approved concrete or such other materials as may be approved by the Engineer, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Section 02223, and to the percentage compaction outlined therein. The cost of this refilling operation, including any tests associated therewith, shall be borne by Contractor.
- K. Contractor shall segregate excavated on-site materials into three categories for storage – sand, topsoil, and other materials (brush, trees, etc.).
- L. Contractor shall not store any excavated materials except sand in any current or future sand bed areas, except those sand beds being eliminated as part of this project.

3.04 DISPOSAL OF MATERIAL

- A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site unless Owner designates an on-site location.
- B. On-site disposal of surplus material will be allowed only at locations designated by Owner and approved by Engineer. Reuse of excavated material as on-site fill shall conform to Section 02223.
- C. Make all arrangements for disposal sites, unless the Owner designates special locations. All expenses for disposal shall be borne by the Contractor. Bidders shall carefully investigate all aspects of surplus material disposing operations.

- D. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project Owner, and shall include any other conditions pertinent to the situation as agreed upon by each party. A copy of said agreement shall be furnished to the Owner.

3.05 FIELD QUALITY CONTROL

- A. Contractor shall perform field inspections under provisions of Section 01400.
- B. Provide for visual inspection of bearing surfaces.

3.06 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.
- C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building or structure.

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade and paving.
- D. Classification of materials.
- E. Consolidation and compaction.

1.02 RELATED SECTIONS

- A. Section 01400 – QUALITY CONTROL: Testing Fill Materials.
- B. Section 01500 – TEMPORARY FACILITIES
- C. Section 02110 – SITE CLEARING
- D. Section 02222 – EXCAVATING
- E. Section 02228 – COMPACTION

1.03 REFERENCES

ASTM C136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1556	Density of Soil in Place by Sand-Cone Method
ASTM D1557	Laboratory Compaction of Soil Using Modified Effort
ASTM D2922	Density of Soil in Place by Nuclear Methods
ASTM D3017	Water Content of Soil in Place by Nuclear Methods

1.04 SUBMITTALS

- A. Granular Materials
 - 1. Granular materials required for filling, backfilling, subbase and other purposes shall be as shown on the Drawings. Prior to bidding, prospective contractors shall familiarize themselves with the available quantities of approved on-site and off-site materials.
 - 2. For each on-site or off-site material proposed, furnish to Engineer for approval a certified gradation analysis at least 10 days prior to date of anticipated use of such material. Except as specified herein, only off-site approved materials shall be utilized.

3. The Engineer reserves the right to inspect proposed source of off-site granular material and to order such tests of the materials as he deems necessary to ascertain its quality and gradation of particle size. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously, submit results of these tests to the Engineer for consideration.
4. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer, and only material from approved sources shall be used.
5. For each on-site material to be used as a substitute for off-site material, a certified gradation analysis shall be submitted for every 2,000 cubic yards of material to be used.
6. At a minimum, one Proctor shall be submitted for each material type to be used. If more than 5,000 cubic yards of a material is required, one Proctor shall be submitted for every 5,000 cubic yards of material to be used. Refer to Section 02228 for the type of Proctor to be performed.
7. Additional Proctor and gradation tests of on-site material shall be performed when the material has appeared to change significantly either from a visual inspection or a review of the gradation analysis. Additional testing requested by the Engineer shall be paid for by the Contractor. Materials shall be segregated from other types following gradation analysis.
8. Proctor tests of off-site materials submitted for use on this project shall have been performed within the last six months.

B. Geotextile Fabrics

1. Submit a 1 square foot sample of each geotextile to be used.
2. Submit manufacturer's specifications of average roll characteristics for standards ASTM geotextile tests for each geotextile to be used.

PART 2 PRODUCTS

2.01 ON-SITE MATERIALS

- A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If he so elects, the Contractor may, at his own expense, substitute other types of material in place of Type A material, provided such substitution is approved in advance by the Engineer. All replaced or surplus material shall be disposed of as outlined in Section 02110.

1. Unclassified Excavated Material

Type A-1 - Referred to as "excavated material" and from which all frozen material, boulders, trash, and foreign debris greater than 6 inches in any dimension has been removed. Approved Type A-1 material shall be used for all backfilling except under structures.

Type A-2 - Referred to as “select excavated material” and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 2 inches in any dimension have been removed.

2. Classified Excavated Material - the reuse of excavated on-site materials as a substitute for off-site sources of Type “B” gravel or Type “C” sands shall be permitted only when the on-site material meets the requirements for the equivalent off-site material, as specified in this Section. If such excavated materials are used, submit for approval in writing the proposed methods of excavation, location of stockpiles, quantities of required sand and gravels, estimated excavation quantities, and proposed excavation limits within the accepted excavation area. Provide a demonstration at least 10 days prior to commencement of excavation that the methods will provide consistent quantity and quality of material as specified for Type “B” gravels and Type “C” sands. The Engineer will require subsurface investigations, sampling, and testing to confirm the extent and quality of the proposed material. Cost of all investigations, sampling, and testing shall be the Contractor’s responsibility.

B. Type E - Borrow Material

1. “Borrow material” is defined as approved material required for fill or backfill in excess of the quantity of available approved material designated as Type “A” material.
2. No such borrow material shall be used on this project unless specified in the Contract Documents and except within the limits of borrow areas designated on the Drawings.
3. Approval of all borrow material must be obtained from the Engineer, and only material from approved sources shall be used.
4. Use of designated borrow areas shall be subject to the approval of the Engineer and Owner at all times. Test pits and analyses of borrow material shall be provided as required by the Engineer for each borrow area and at the expense of the Contractor. In addition, the Engineer may require full excavation and restoration plans for each borrow area. All borrow areas shall be stripped of topsoil and organic materials far enough in advance of operations that contamination of borrow material is prevented.
 - a. Unclassified Borrow Material - This material consists of a naturally occurring mixture of sand, silts, clay, gravel, deteriorated rock, or other inorganic particles.

Type E-1 - Referred to as “common borrow material”, from which all frozen material, boulders, trash or debris have been removed.

Type E-2 - Referred to as “select borrow material” and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 6 inches in any dimension have been removed.

- b. Classified Borrow Material - Where the Contract Documents allow the use of on-site borrow areas as a substitute for off-site sources of Type “B” gravels and Type “C” sands, the requirements for each of those on-site materials shall be the same as off-site sources.

In addition, all of the requirements for “classified excavated material” (Type “E” material) must be met at least 10 days prior to the acceptance of approved borrow areas for use as a source of Type “B” gravel or Type “C” sand.

2.02 OFF-SITE MATERIAL

- A. Within the following specifications where grain size distributions require a maximum 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM Standard D1140.
- B. It is the intent of the specifications to allow the use of granular materials from local suppliers. Material specifications shall conform to the requirements of the Commonwealth of Massachusetts, Massachusetts Department of Transportation, Standard Specification for Highways and Bridges, 1988 edition, as amended.
- C. No material specified in this Article 2.02 shall be used on this project until acceptance is obtained from the Engineer, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Engineer's acceptance prior to the use of the material.
- D. Gravel
 - 1. Shall be a mixture of hard, durable gravel and sand.
 - 2. Shall be free from organic matter, trash, shale, debris, snow, ice, and other frozen or mechanically deleterious material.
 - 3. Each type of gravel fill material shall also meet the gradation requirements of Table 1.
 - 4. Gravel Fill Materials
 - a. Type B - Gravel Borrow.

TABLE 1
GRADATION REQUIREMENTS: GRAVEL

SIEVE SIZE	PERCENT PASSING BY WEIGHT	
	GRAVEL TYPE	
	TYPE B-1 (M1.03.0 TYPE A OR B OR C)	TYPE B-2 (M1.03.1)
3"	100	100
2"		
1-1/2"		70-100
3/4"		50-85
1/2"	50 – 85	
No. 4	40-75	30-60
No. 50	8-28	
No. 200	0-10	0-10

Maximum size of stone in gravel shall be as follows:

- M1.03.0 Type a = 6 inches largest dimension
- M1.03.0 Type b = 3 inches largest dimension
- M1.03.0 Type c = 2 inches largest dimension

- E. Type C - Sand
 - 1. Shall be a mixture of natural fine gravel and sand.

2. Shall be free from loam or clay, surface coatings and deleterious materials.
3. The allowable amount of material passing a No. 200 sieve shall not exceed 10 percent by weight. Each type of sand fill material shall also meet the gradation requirements of Table 2.
4. Sand Borrow Materials
 - a. Type C-1 - Sand Borrow
 - b. Type C-2 - Select Subdrain

TABLE 2
GRADATION REQUIREMENTS: TYPE C - SAND

SIEVE SIZE	PERCENT PASSING BY WEIGHT	
	GRAVEL TYPE	
	c-1 M1.04.0	c-2
3/8"	85	100
No. 4	60-100	100
No. 16	35-80	80
No. 50	10-55	55
No. 100	2-10	10
No. 200		0-10

- F. Type D - Dense Grade Crushed Stone
1. Shall be clean, hard, durable, angular crushed gravel.
 2. Shall be free from organic matter, trash, debris, snow, ice, and other frozen or mechanically deleterious material.
 3. Unless otherwise specified, crushed gravel shall be composed of granite or limestone pieces, chips, and fines.

(continued)

4. All crushed stone shall also meet the gradation requirements of Table 3.

TABLE 3

GRADATION REQUIREMENTS: TYPE D - CRUSHED STONE

TYPE	TYPE D-1 M2.01.7	TYPE D-2 M2.01.3	TYPE D-3 M2.01.1
2"	100		100
1-1/2"	70-100	100	95-100
1-1/4"		85-100	
1"			35-70
3/4"	50-85	10-40	0-25
1/2"		0-8	
No. 4	30-55		
No. 50	8-24		
No. 100	3-10		

G. Reclaimed Materials

1. Reclaimed materials where allowed shall have the following gradations.

TABLE 4

GRADATION REQUIREMENTS: RECLAIMED MATERIALS

SIEVE SIZE	PERCENT PASSING BY WEIGHT	
	RECLAIMED MATERIAL TYPE	
	R-1	R-2
3 inch	100	100
2 inch		70-100
1-1/2 inch	70-100	
3/4 inch	50-85	50-85
No. 4	30-60	30-55
No. 50	8-24	8-24
No. 200	0-10	3-10

2. Aggregate for Crushed Stone for Blending, used to correct gradation deficiencies, shall conform to the requirements of MassDOT Standard Specifications for Highways and Bridges as amended Subsections M2.01.0 to M2.01.6 of Division III, Materials.

H. Controlled Density Fill (CDF)

1. CDF material shall be a flowable, self-consolidating, rigid setting, low density material that can substitute for compacted gravel for backfills, fills, and structural fills.
2. It shall be a mixture of Portland cement, sand and water designed to provide a compressive strength of 30 to 80 psi at 28 days, and 100 psi at 90 days.
3. CDF is to be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10 to 12 inches.

4. Materials shall meet the following requirements:

Portland Cement	AASHTO M85
Sand	MassDOT Specs, M4.02.02
Air Entraining Admixture	M4.02.05
5. CDF material shall meet the requirements of the Commonwealth of Massachusetts, MassDOT Department Standard Specifications for Highways and Bridges Supplemental Specifications, as amended, Type 2E.

I. Type F - Gravel-Cement Mixtures

1. Shall be a mixture of 15 parts gravel to one part cement by weight.
2. Gravel shall be Type C.
3. Cement shall be Type I Portland cement.
4. Mixing of material shall be performed in an approved mixer.
5. The mixture shall be placed and compacted in accordance with Section 02228.

2.03 ACCESSORIES

- A. Separation geotextile fabric shall consist of a non-woven fabric that meets or exceeds the following requirements.

TEST	ASTM	CRITERIA
Mass per unit area	D5261	>=8 oz/sy
Apparent opening size	D4751	<No. 70 sieve
Puncture resistance	D4833	>= 130 lb
Tensile strength	D4632	>= 150 lb
Permittivity	D4491	>= 0.1 sec-1
Burst strength	D3786	>= 200 psi

- B. The Contractor shall submit the manufacturer's minimum average roll values to the Engineer for approval. No geotextile fabric shall be used on this project until approval is granted from the Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify fill materials to be used are acceptable.
- B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.
- C. Verify that foundation walls are properly shored and braced to withstand lateral soil pressures created when backfilled material is placed against such walls.

- D. Verify that underground tanks are anchored to their own foundation to avoid flotation after backfilling.

3.02 PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type B gravel fill and compact to density equal to or greater than requirements for subsequent backfill material.
- C. Inspect spaces to be backfilled and remove all unsuitable materials including sheeting, bracing, forms, and debris prior to commencing backfilling operations.

3.03 BACKFILLING

- A. Backfill areas to required contours, grades, and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids.
- D. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.
- E. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Engineer.
- F. Place and compact fill materials in continuous layers to meet appropriate requirements of Table No. 1 of Section 02228.
- G. Employ a placement and compaction method consistent with Section 02228 that does not disturb or damage adjacent walls, drainage systems, damp-proofing, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.
- H. Maintain optimum moisture content of backfill materials to attain required compaction density.
- I. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- J. Backfill simultaneously on each side of unsupported foundation walls [until supports are in place.
- K. Place geotextile fabric as shown on the Drawings.
- L. Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise.
- M. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.

- N. Remove surplus backfill materials from site.
- O. Leave fill material stockpile areas completely free of excess fill materials.

3.04 TOLERANCES

- A. Top Surface of Backfilling Under Pavement Subgrade - +1 inch from required elevations.
- B. Top Surface of Backfilling Under Paved Areas - +1/2 inch from required elevations.
- C. Top Surface of General Backfilling - +1 inch from required elevations.

3.05 FIELD QUALITY CONTROL

- A. Contractor shall perform field inspection and testing under provisions of Section 01400 and as identified in this specification.
- B. Tests and analysis of fill material will be performed in accordance with ASTM D1557 and ASTM D422 and with Section 02228.
- C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- E. Frequency of Tests – At least twice each backfilling area.
- F. Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.06 PROTECTION OF FINISHED WORK

- A. Protect Finished Work under provisions of Section 01500.
- B. Regrade and recompact fills subjected to vehicular traffic.

3.07 SCHEDULE

- A. Slab-on-Grade
 - 1. Type B fill, compacted to 95 percent.
- B. Foundation Walls and Tank Walls
 - 1. Gravel Type B-2 fill, to subgrade elevations, each lift, compacted to 95 percent.
- C. Fill Under Grass Areas - Gravel Type A fill, to 6 inches below finish grade, compacted to 90 percent.
- D. Fill Under Landscaped Areas - Gravel Type A fill, to 12 inches below finish grade, compacted to 90 percent.
- E. Fill for French Drains and Well Points - Type A fill, to 12 inches below finish grade, compacted to 90 percent.

- F. Fill Under Interlocking Pavers - Type B-2 fill, to underside of sand leveling bed.
- G. Fill Under Asphalt Concrete Paving - Type B-2 fill, as shown on Drawings, compacted to 95 percent.
- H. Fill to Correct Over-Excavation - Type B-1 or B-2 fill, flush to required elevation, compacted to 95 percent.
- I. Fill over Drainage Piping Gravel Cover - Type D-1 or D-2 fill, as shown on Drawings, compacted to 95 percent.

END OF SECTION

SECTION 02228

COMPACTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01400 – QUALITY CONTROL
- C. Section 02223 – BACKFILLING

1.03 REFERENCES

ASTM D698	Laboratory Compaction of Soil Using Standard Effort
ASTM D1556	Density of Soil in Place by the Sand-Cone Method
ASTM D1557	Laboratory Compaction of Soil Using Modified Effort
ASTM D2922	Density of Soil in Place by Nuclear Methods
ASTM D3017	Water Content of Soil in Place by Nuclear Methods

1.04 SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.
- B. Compaction test results shall be submitted to the Engineer.

1.05 QUALITY ASSURANCE

- A. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure, and piping to be placed thereon, or therein, without damage to the new or existing facilities.
- B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.
- C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.
 - 1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-

grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.

2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials to be compacted shall be as specified in Section 02223.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.
- B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.
- C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.
- D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in "dry" conditions.

3.02 PREPARATION

- A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.
- B. Proof-roll all subgrade surfaces to accept fill material.
- C. Each layer of fill shall be compacted to the specified density the same day it is placed.
 1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.
- D. Compact each lift in accordance with Table 1.
- E. Match compaction equipment and methods to the material and location being compacted in order to obtain specified compaction, with consideration of the following guidelines:
 1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.
 2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.

3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 pounds per linear inch (PLI).
4. Vibratory compaction is preferred for dry, granular materials.
5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
6. Hydraulic compaction by pounding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Engineer and after a demonstration of effectiveness.
7. Backhoe mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self propelled vibratory compactors or static roller.
8. For plastic pipelines (PVC, PE, or PB) do not compact directly over center of pipe until backfill has reached 2 feet above top of pipe.

TABLE 1
COMPACTION REQUIREMENTS

CONSTRUCTION ELEMENT	MAXIMUM COMPACTION LAYER THICKNESS (INCHES)	ASTM	MINIMUM COMPACTION
I. STRUCTURES*			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
b. Fill around structures and above footings	8	D1557	95%
II. TRENCHES**			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	95%
c. Backfill below 4 feet under pavement	18	D1557	93%
d. Backfill under lawns, gardens and cultivated fields	24	D1557	90%
e. All other trenches***	36	D698	85%
III. EMBANKMENTS AND FILLS			
a. Fill under streets, parking lots, and other paved areas	12	D1557	95%
b. Embankments not supporting pavement or structures	18	D1557	90%
c. Rough site grading	24	D698	85%

* Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.

** The first 1 foot above pipelines shall have a compacted thickness of 12 inches.

*** For cross-country pipelines, lifts may be compacted with a backhoe bucket or other means, and slightly mounded at the surface provided that regrading is performed within the guarantee period.

3.03 FIELD QUALITY CONTROL

A. Material Testing

1. The Contractor shall provide testing of materials as described in this specification.
2. Testing will be done by a qualified, independent testing laboratory engaged by the Contractor and in accordance with this Section and Section 01400.
3. The Contractor shall obtain representative material samples to be used in testing as agreed-to by the Engineer.
4. For each material which does not meet specifications, the Contractor shall retest and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The Contractor shall coordinate and order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts in accordance with Section 01400 and this specification.
2. One test per lift shall be performed for every 200 cubic yards (or fraction thereof) of fill placed.
3. One test per lift shall be performed for every 75 linear feet (or fraction thereof) of backfill placed along foundation walls or in trenches. When backfilling on both sides of a foundation wall, one test per lift shall be performed on each side.
4. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer.
5. For each test which does not meet specifications, the Contractor shall retest and shall replace all material included in that lift or section, replace with acceptable material, and compact to specifications, at no additional compensation.
6. The Contractor shall anticipate these tests and incorporate the time and effort into procedures.
7. Nuclear moisture density testing by "probe" methods will be acceptable for compacted layers not exceeding 8 inches in thickness.
 - a. Nuclear "backscatter" methods will be acceptable only for testing asphalt paving layers not in excess of 3 inches in thickness.
 - b. Only certified personnel will conduct nuclear testing.
 - c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to Material Testing Materials.

- D. Alternate Methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer's satisfaction.
- E. Select Material - On-Site
 - 1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.
 - 2. No on-site material shall be used without prior approval of the Engineer.
- F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04 PROTECTION

- A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.
- B. As backfill progresses, the surface shall be graded so as to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.
- C. The Contractor shall not place a layer of fill on snow, ice, or soil that was permitted to freeze prior to compaction.
 - 1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 02832
SEGMENTAL RETAINING WALLS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. This Section includes single-depth segmental retaining walls with soil reinforcement.
- B. Related Sections:
 - 1. Section 02222 - Excavating
 - 2. Section 02223 – Backfilling
 - 3. Section 02228 - Compaction

1.03. PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design segmental retaining walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Engineering design shall be based on the following loads and be according to NCMA's "Design Manual for Segmental Retaining Walls."
 - 1. Gravity loads due to soil pressures resulting from grades and sloped backfill indicated.
 - 2. Superimposed loads – 2' soil surcharge.

1.04. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For concrete units.
- C. Delegated-Design Submittal: For segmental retaining walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, licensed in the State of Massachusetts, responsible for their preparation.
- D. Product Certificates: For segmental retaining wall units, from manufacturer.

1.05. QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to segmental retaining walls including, but not limited to, the following:
 - a. Structural load limitations.
 - b. Construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Field quality-control procedures.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Store and handle concrete units and accessories to prevent deterioration or damage due to contaminants, breaking, chipping, or other causes.
- B. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geosynthetics before using and examine them for defects as material is placed.

PART 2 PRODUCTS

2.01. SEGMENTAL RETAINING WALL UNITS

- A. Concrete Units: ASTM C 1372, Normal Weight, except that maximum water absorption shall not exceed 7 percent by weight and units shall not differ in height more than plus or minus 1/16 inch from specified dimension.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, licensees of one of the following:
 - a. Belgard Hardscapes.
 - b. E.P. Henry.
 - c. Keystone Retaining Wall Systems, Inc.; a Contech company.
 - d. Approved equal.
 - 2. Provide units that comply with requirements for freeze-thaw durability.
 - 3. Provide units that interlock with courses above and below by means of integral lugs or lips.
- B. Color: As selected by Owner from manufacturer's full range.

- C. Shape and Texture: Provide units of any basic shape and dimensions that will produce segmental retaining walls of dimensions and profiles indicated without interfering with other elements of the Work and with machine-split textured, flat exposed face.
- D. Batter: Provide units that offset from course below to provide at least 1:16 batter.
- E. Cap Units: Provide cap units of same shape as other units with smooth, as-cast top surfaces without holes or lugs.
- F. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces matching face.

2.02. INSTALLATION MATERIALS

- A. Clips: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from nondegrading polymer reinforced with glass fibers.
- B. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.
- C. Leveling Base: Comply with wall designer's requirements.
- D. Drainage Fill: Unless otherwise required by the designer, provide material complying with the materials and gradation requirement of AASHTO No. 57.
- E. Reinforced-Soil Fill: Comply with requirements in Division 2 Section "Earthwork" for satisfactory soils.
- F. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent.
- G. Apparent Opening Size: No. 70 to 100 sieve, maximum; ASTM D 4751.
- H. Minimum Grab Tensile Strength: 110 lb; ASTM D 4632.
- I. Minimum Weight: 4 oz./sq. yd..
- J. Subdrainage Pipe and Filter Fabric: Comply with requirements in Division 2 Section "Subdrainage."
- K. Soil Reinforcement: Product specifically manufactured for use as soil reinforcement and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Huesker, Inc.
 - b. Mirafi Construction Products; Ten Cate Nicolon.
 - c. Tensar Earth Technologies, Inc.

- d. Approved equal.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. RETAINING WALL INSTALLATION

- A. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.
 - 1. Lay units in running bond.
 - 2. Form corners and ends by using special units.
- B. Leveling Base: Place and compact base material to thickness indicated and with not less than 95 percent maximum dry unit weight according to ASTM D1556.
- C. First Course: Place first course of segmental retaining wall units for full length of wall. Place units in firm contact with each other, properly aligned and level.
 - 1. Tamp units into leveling base as necessary to bring tops of units into a level plane.
- D. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.
 - 1. For units with lugs designed to fit into holes in adjacent units, lay units so lugs are accurately aligned with holes, and bedding surfaces are firmly seated on beds of units below.
 - 2. For units with lips at front of units, slide units as far forward as possible for firm contact with lips of units below.
 - 3. For units with lips at bottom rear of units, slide units as far forward as possible for firm contact of lips with units below.
- E. Cap Units: Place cap units and secure with cap adhesive.

3.03. FILL PLACEMENT

- A. General: Comply with requirements in Division 2 Section "Earthwork," NCMA's "Segmental Retaining Wall Installation Guide," and segmental retaining wall unit manufacturer's written instructions.
- B. Fill voids between and within units with drainage fill. Place fill as each course of units is laid.
- C. Place, spread, and compact drainage fill and soil fill in uniform lifts for full width and length of embankment as wall is laid. Place and compact fills without disturbing alignment of units.

Where both sides of wall are indicated to be filled, place fills on both sides at same time. Begin at wall and place and spread fills toward embankment.

1. Use only hand-operated compaction equipment within 48 inches of wall, or one-half of height above bottom of wall, whichever is greater.
 2. Compact reinforced-soil fill to not less than 95 percent maximum dry unit weight according to ASTM D1556.
 - a. In areas where only hand-operated compaction equipment is allowed, compact fills to not less than 90 percent maximum dry unit weight according to ASTM D1556.
- D. Place a layer of drainage fill at least 12 inches wide behind wall to within 12 inches of finished grade. Place a layer of drainage geotextile between drainage fill and soil fill.
- E. Wrap subdrainage pipe with filter fabric and place in drainage fill as indicated, sloped not less than 0.5 percent to drain.
- F. Place impervious fill over top edge of drainage fill layer.
- G. Slope grade at top of wall away from wall unless otherwise indicated. Slope grade at base of wall away from wall. Provide uniform slopes that will prevent ponding.
- H. Place soil reinforcement in horizontal joints of retaining wall where indicated and according to soil-reinforcement manufacturer's written instructions. Embed reinforcement a minimum of 8 inches into retaining wall and stretch tight over compacted backfill. Anchor soil reinforcement before placing fill.
1. Place additional soil reinforcement at corners and curved walls to provide continuous reinforcement.
 2. Place geosynthetics with seams, if any, oriented perpendicular to segmental retaining walls.
 3. Do not dump fill material directly from trucks onto geosynthetics.
 4. Place at least 6 inches of fill over reinforcement before compacting with tracked vehicles or 4 inches before compacting with rubber-tired vehicles.
 5. Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforcement layer.

3.04. CONSTRUCTION TOLERANCES

- A. Variation from Level: For bed-joint lines along walls, do not exceed 1-1/4 inches in 10 feet, 3 inches maximum.
- B. Variation from Indicated Batter: For slope of wall face, do not vary from indicated slope by more than 1-1/4 inches in 10 feet.
- C. Variation from Indicated Wall Line: For walls indicated as straight, do not vary from straight line by more than 1-1/4 inches in 10 feet.

3.05. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ASTM D422, ASTM D1557 and Section 02228.
- C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 02228.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Proof roll compacted fill surfaces under paving.

3.06. PROTECTION OF FINISHED WORK

- A. Protect Finished Work under provisions of Section 01500.
- B. Regrade and recompact fills subjected to vehicular traffic.

3.07. ADJUSTING

- A. Remove and replace segmental retaining wall construction of the following descriptions:
 - 1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if Engineer approves methods and results.
 - 2. Segmental retaining walls that do not comply with other requirements indicated.
- B. Replace units so segmental retaining wall matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement.

END OF SECTION

SECTION 02980
SITE REHABILITATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Site rehabilitation of lawns, existing cultivated or landscaped items such as trees, shrubs, hedges, saplings, vines, ground cover vegetation, gardens, etc.
- B. Restoration of uncultivated lands.
- C. Restoration of miscellaneous areas between edge of right-of-way and edge of property, including non-paved driveway aprons.
- D. Topsoil, fertilizer, seeding, mulching, and planting.
- E. Site rehabilitation of walls, terraces, fences, ditches, drains, culverts, drives, posts, patios, outdoor recreational equipment, garden decorations and appurtenances, small structures, and other artificial features.
- F. Site modifications and development to meet new conditions.
- G. Removal and disposal of all excess materials, equipment, trash, and debris used for, or resulting from, the work included in this Section.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01039 – COORDINATION
- C. Section 01300 – SUBMITTALS
- D. Section 02110 – SITE CLEARING

1.03 REFERENCES

- A. The American Association of Nurserymen Standards – ANSI Standard 2-60.1, “Nursery Stock.”

1.04 QUALITY ASSURANCE

- A. Areas and features to be restored:
 - 1. All areas, including natural features occurring thereon, which are damaged or disturbed by the Contractor’s operations, shall be restored, repaired or replaced to the same or superior condition which existed prior to construction or as modified herein or as shown on the Drawings.
 - 2. Artificial features shall be restored equal to a new condition or as modified herein or as shown on the Drawings.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit the source nursery for all plantings.
- C. Topsoil - Submit sieve analysis and characteristics of topsoil as listed in PART 2 - PRODUCTS.
- D. Submit seed mixture data.

1.06 QUALIFICATIONS

- A. All planting material to be furnished from a nursery which meets the requirements of the American Association of Nurserymen.

1.07 PACKING AND SHIPPING

- A. All seed furnished for this project shall be delivered in standard size unopened bags of the vendor, showing weight, mixture, vendor's name and guaranteed analysis.

1.08 STORAGE

- A. Seed shall be properly stored in dry conditions at the site of the work.
 - 1. Any seed damaged or spoiled during storage shall be replaced by the Contractor.

1.09 ENVIRONMENTAL CONDITIONS

- A. Topsoil shall not be delivered or placed in a frozen or muddy condition.
- B. Seeding is to be done on dry or moderately dry soil.
 - 1. Seeding is to be done when the wind velocity does not exceed 5 miles per hour.

1.10 SCHEDULE

- A. The Contractor shall do all seeding during the periods of May 1st to June 15th, or August 15th to October 1st.
 - 1. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Contractor.

1.11 GUARANTEE

- A. Any new, reestablished, replaced or disturbed plant material that fails to respond properly within the one-year guarantee period shall be replaced at the Contractor's expense.
- B. Any new, reestablished, replaced, or disturbed surface treatment (paving and asphalt) that cracks, deforms, or deviates from the installed grade within one year of the installation shall be replaced at the Contractor's expense.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil

1. Topsoil shall be natural, fertile, friable agricultural soil capable of sustaining healthy vegetative growth.
2. Topsoil shall meet the following gradation requirements free of stones, roots, sticks and other foreign substances:

TABLE 1
GRADATION OF TOPSOIL

GRAIN DIAMETER	SIEVE SIZE	PERCENT PASSING BY WEIGHT
6.3 mm	6.3 mm	100
4.75 mm	No. 4	60-85
.075 mm	No. 200	20-45
.002 mm	--	7-27

- a. Topsoil shall contain less than 52 percent sand.
3. The pH of topsoil shall be between 5.0 and 7.0.
4. Topsoil shall contain no less than 6.0 percent organic matter.
5. Topsoil may be from previously excavated, stockpiled, and protected materials, provided the materials meet the requirements for topsoil.

B. Fertilizer

1. General Fertilizer

- a. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.
- b. All fertilizer shall contain a minimum of 10 percent nitrogen, 6 percent available phosphorous and 4 percent potash.
- c. Other commercially available fertilizers, such as 20-10-10 and 12-6-6, may be utilized provided that spreading rates are adjusted to provide the aforementioned minimum requirements for nitrogen.

2. Plant Fertilizer - As recommended by local Soil Conservation District of the Department of Agriculture for the type(s) of soil(s) and plant(s).

C. Seed

1. All seed shall be fresh, recleaned and of the latest crop year.

2. Each component shall meet or exceed the minimum State and Federal requirements for purity and germination for that component.
3. The weed content of each component shall not exceed 0.1 percent.
4. The seed mix for lawns and other areas shall be as follows:

TABLE 2
PERMANENT SEEDINGS

SPECIES	PERCENT BY WEIGHT
Creeping Red Fescue	35%
Kentucky Bluegrass	25%
Perennial Ryegrass	40%

5. Variations may be recommended by qualified personnel, but shall not be used without approval by the Engineer.
 6. For uncultivated areas furnish perennial rye grass seed.
- D. Mulch for Seeded Areas - Mulch shall be oat, wheat or rye straw, free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.
- E. Mulch for Tree or Shrub Plantings - Mulch shall consist of dry, clean, shredded hardwood bark.
- F. Plantings - Trees, shrubs, vines, ground cover, and other vegetation to be replaced or installed new as specified shall meet the requirements of the American Association of Nurserymen.
1. Classifications of plants, dimensions, planting procedures, etc., shall conform to The American Association of Nurserymen Standards – ANSI Standard 2-60.1, “Nursery Stock.”
- G. Tree wrapping shall be 8 ounce first quality burlap.
- H. All disturbed existing pavement markings and striping shall be replaced to original or better condition at the expense of the Contractor.
- I. Curbing and Berms – All disturbed existing curbing and berms, including Cape Cod berms, shall be replaced to original or better condition and material at the expense of the Contractor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Determine that surface areas are ready for finish grading and/or to receive topsoil and seeding or plantings.
1. Remove trash, debris, large stones, and other foreign materials from surface areas to be restored or rehabilitated.

2. Topsoil shall be free of frozen fragments, debris, large stones, and other foreign materials.

3.02 PREPARATION

A. Finish Grading

1. Areas requiring topsoil shall be rough graded to within 4 inches of finished grade to provide a minimum thickness after normal compaction of 4 inches of topsoil at all locations.
2. All such areas, whether in cut or fill, shall be loosened to a depth of 1 inch, be parallel to finished grade as shown or required and shall be free of all stones, larger than 1 inch, roots, rubbish, and other deleterious material.

3.03 INSTALLATION

A. Areas to be Developed and or Restored

1. The Contractor shall perform all required grading, topsoiling, fertilizing, seeding, planting, mulching, and maintenance of areas, all in accordance with the Drawings and as specified herein.
2. Unless shown otherwise on the Drawings, the entire unpaved area within the grading limits and within the overall areas excavated and backfilled shall be seeded in accordance with this section.
3. New landscaping work and artificial features, if any, are shown on the Drawings and specified elsewhere.
4. All seeding shall be done by hydroseeding only.

- #### B. Existing trees, plants, shrubs, saplings, ground cover, vines, etc., which are disturbed or damaged by the Contractor's operations shall be replaced with new seeding and/or plant materials.

3.04 TOPSOILING

- #### A. Topsoil shall be furnished and spread across the required areas to a loose depth of approximately 4 to 6 inches.

1. Stockpiled topsoil may be used if it is acceptable to the Engineer.
2. In the event this topsoil is not satisfactory, or is inadequate to cover the required areas, the Contractor shall furnish the required amount of satisfactory topsoil from approved sources off the site.

- #### B. The loose topsoil shall be uniformly compacted with a light hand roller so that it shall have a final depth of not less than 4 inches.

1. When finished, the topsoiled surface shall conform to the finished grades and shall have a generally smooth surface at the time of seeding.
2. Any irregularities shall be corrected before the fertilizer and seed are placed.

3. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Contractor's expense.

3.05 FERTILIZING

- A. The fertilizer shall be uniformly spread over area that will be mowed by a mechanical spreader at the rate of 25 pounds per 1,000 square feet. If applicable, created wetland biofilter areas that will be allowed to grow in a natural condition will not be fertilized.
 1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.
 2. Other commercial fertilizers, such as 20-10-10 or 12-6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1,000 square feet.

3.06 SEEDING

- A. Seed shall be applied at a rate of not less than 5 pounds per 1,000 square feet, using a mechanical spreader.
 1. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.
- B. The process of spraying grass seeds, water, fertilizer, and mulch known as hydro-seeding or hydro-mulching shall be utilized provided that water hazards are minimized.
 1. Presoaking, the spraying of the materials and watering after spraying shall be in strict accordance with the manufacturer's instructions.
 2. All materials, protection, maintenance, etc., shall be in conformance with this specification.
 3. The mulch may be a wood fiber material compatible with the spray equipment.
 4. Watering - Daily for two weeks, then weekly for six weeks.

3.07 PLANTING

- A. New plant materials shall be as listed and displayed on the Drawings. Plant materials that are to replace existing plant materials shall be of the same genus and species as the original, and shall be placed in the same location as the item being replaced.
- B. Plants shall be set plumb and true.
 1. Shape planting area to form a shallow saucer around new shrubs and trees.
- C. For all trees of 2-inch caliber or larger, wrap with tree wrap.
 1. Begin at base of tree and work upward to the first branches.
 2. Tie the burlap wrap with cord (no synthetic cord or wire) at 2-foot intervals and at the bottom and top.

3.08 MULCHING AND PROTECTION

- A. The Contractor shall protect and maintain seeded areas to assure a full even stand of grass.
 - 1. Immediately after seeding and rolling, the Contractor shall apply oat, wheat, or rye straw, free from noxious weeds, as mulch, to a loose depth of about 1 inch.
 - 2. The Contractor shall perform all watering and reseeded as necessary for a minimum of 30 days and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses.

3.09 MAINTENANCE AND GUARANTEE

- A. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause shall be reseeded at full rate and refertilized at one-half rate and protected and maintained until such a full stand has been obtained.
- B. Plantings shall be maintained by the Contractor for one year. Maintenance shall include watering during dry periods, pruning of broken or dead branches, and weeding of noxious and invasive weed growth impacting plant establishment.
- C. New plantings shall be guaranteed for one year from the date of planting completion and acceptance of the completed work. At the completion of the guarantee period the Contractor shall replace all dead, dying, or disfigured plants with new plants of the size and species as originally specified for the project and shall then request an inspection and acceptance of the work.
- D. New paving shall be guaranteed for one year from the date of final paving completion and acceptance of the completed work. At the completion of the guarantee period the Contractor shall replace all cracked, deformed, or paving that has deviated from the installed grade as originally specified for the project and shall then request an inspection and acceptance of the work.

3.10 RESTORATION OF UNCULTIVATED LANDS AND MISCELLANEOUS AREAS

- A. Areas of uncultivated land shall be restored as follows:
 - 1. The disturbed surfaces shall be rough-graded to the original elevations (± 1 inch) and general appearance which existed prior to construction (or to the new elevations and grades which are required), all debris, loose stones over 1 inch, boulders, etc., being removed in the process.
 - 2. The surface shall then be seeded with perennial rye grass, being spread at the rate of 1 lb. per 800 square feet.
 - 3. The area need not be raked or rolled after completion of seeding.
- B. Miscellaneous areas including non-paved driveway aprons and areas between edge of right of way and edge of property shall be restored to original or better condition. Contractor may also use salvageable or reused on-site materials including but not limited to gravel, cobbles, shell, and stone to match existing. Paving shall be per Section 02510. Loam and seed shall be per this Section.

3.11 SPECIAL CONDITIONS

- A. Damaged Trees - Vegetation which has been damaged by construction activities and deemed non-functional by the Owner or engineer, shall be replaced by the Contractor with vegetation of the same caliper, genus, and species at no additional compensation to the Contractor.
- B. Damaged Pavement and Non-Paved Driving Surfaces - Pavement and unpaved driving surfaces which have been damaged by construction activities and deemed non-functional by the Owner or engineer, shall be replaced by the Contractor with pavement or similar damaged material of the same caliper, at no additional compensation to the Contractor.
- C. Damaged Curbing and Berms – Curbing and berms, including Cape Cod berms, which have been damaged by construction activities and deemed non-functional by the Owner or engineer, shall be replaced by the Contractor with curbing and/or berms of the same material at no additional compensation to the Contractor.
- D. Damaged Pavement Markings – Pavement lines and striping which have been damaged by construction activities and deemed non-functional by the Owner or Engineer shall be replaced by the Contractor with striping and or markings of the same color, size, type, and thickness as the existing markings and striping at no additional compensation to the Contractor.
- E. Damaged Miscellaneous Items – Mailboxes, signs, other landscaping items, patios, walkways and all other site features within the project limits shall be replaced by the Contractor at no additional compensation to the Contractor.

END OF SECTION

SECTION 03001

CONCRETE

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Foundations, walls, slabs-on-grade, and miscellaneous concrete.
- B. Equipment (and housekeeping) pads.
- C. Sidewalks.
- D. Reinforcing steel bars and accessories.
- E. Concrete mixes.
- F. Concrete testing.
- G. Concrete finishes.
- H. Concrete curing and protection.
- I. Bonding agent.
- J. Concrete slab sealer.
- K. Repair to new (defective) concrete and damage to existing concrete.
- L. Saw cutting concrete and repair to exposed steel reinforcement.
- M. Repair to removed anchor bolts.
- N. Non-shrink grout.
- O. Waterstops.
- P. Joint filler and sealant.
- Q. Restrictions regarding embedments in concrete.

1.02. RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS
- B. Section 05510 - CONCRETE AND MASONRY ANCHORS

1.03. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. American Concrete Institute (ACI)

ACI 201.1	Guide for Conducting a Visual Inspection of Concrete in Service
ACI 211.1	Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	Specifications for Structural Concrete
ACI 302.1	Guide for Concrete Floor and Slab Construction
ACI 304	Measuring, Mixing, Transporting and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 308	Guide to Curing Concrete
ACI 309	Guide for Consolidation of Concrete
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 315R	Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Recommended Practice for Concrete Formwork

B. American Society for Testing and Materials (ASTM)

ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM A1064	Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed for Concrete
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C88	Soundness of Aggregates
ASTM C94	Ready-Mixed Concrete
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Portland Cement
ASTM C172	Sampling Freshly Mixed concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C595	Specification for Blended Hydraulic Cements
ASTM C618	Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989	Ground Granulated Blast-Furnace Slag for Use in Concrete
ASTM C1602	Mixing Water Used in the Production of Hydraulic Cement Concrete

1.04. SUBMITTALS

- A. Submit Concrete Mix Designs - Concrete mixes used on this project shall be either established mixes verified by "**Field Test Data**" or new custom laboratory designed "**Trial Mixtures**." Requirements for either option are as follows.

All data shall be dated within the last 12 months. Partial submittal will not be reviewed.

1. List amount and sources of mix ingredients:
 - a. Cement.
 - b. Pozzolans (fly ash and slag).
 - c. Fine aggregate.
 - d. Coarse aggregate.
 - e. Water.
 - f. Admixtures (including fibers).
 2. Strength Test Reports - The average strengths shall be higher than the required average compressive strengths (f'_{cr}) as per ACI 301, paragraph 4.2.3.3.
 3. Typed letter signed by an official from concrete supplier stating that all ingredients for proposed mix(es) are identical and from the same source as ingredients used for concrete in provided strength test reports.
 4. Certified tests of fine and coarse aggregates meeting requirements in Part 2 of this specification.
 5. Certified statement from source of fine and coarse aggregates pertaining to history of alkali-aggregate reactivity (ASR) or State DOT confirmation that ASR issues are not evident at the aggregate source.
 6. Certified mill test of cement and fly ash or slag.
 7. Certified test for amount of water-soluble chloride ion (CL-) in concrete.
 8. One-page admixture catalog cuts.
- B. Submit one-page catalog cut for bonding agent.
- C. Submit one-page catalog cut for retarding admixture.
- D. Submit one-page catalog cut for surface-applied hot weather evaporation reducer.
- E. Submit a written statement regarding Contractor's anticipated curing procedures.

- F. Reinforcing Steel - Submit shop drawings in accordance with ACI 301, ACI 315 and ACI 315R, as modified below.
 - 1. Drawings shall be clearly drawn and show enough details to locate every bar without the need to refer to the Contract Drawings. All construction and control joints must be shown. Photocopies of Contract Drawings, in whole or in part, will not be acceptable.
 - 2. No fabrication shall commence until shop drawings are approved. All bars shall be shop fabricated.
- G. Submit catalog cuts for non-shrink grout.
- H. Submit catalog cut for slab sealer.
- I. Submit catalog cuts for waterstops and waterstop accessories, clearly indicating which item(s) are to be used.
- J. Submit catalog cut for curing compound with fugitive dye specifically indicated.
- K. Submit outline of proposed curing and protection procedures.
- L. If concrete repairs are needed, the Contractor shall submit proposed repair products and procedures specified in Part 3 of this specification.
- M. Submit special requests for embedment of conduit, etc. Reference restrictions in Part 3 of this specification.
- N. After material sources have been established and approved, these sources shall not be changed for the duration of the project.

1.05. COORDINATION

- A. Coordinate all concrete placements with work for all contracts (general, civil, architectural, structural, mechanical, electrical, plumbing, HVAC, etc.) indicated in all specifications and on all Contract Drawings.
- B. Coordinate the installation of all cast-in (embedded) items (i.e., grating frames, anchor rods, etc.) prior to start of concrete placement. Post-installation of cast-in (embedded) items will not be allowed.
- C. Contractor shall receive approval on anticipated curing and protection procedures prior to placement of all concrete.
- D. Coordinate all concrete placements with testing and inspection requirements specified herein.

1.06. QUALITY ASSURANCE

- A. The concrete batch plant providing concrete to this project shall be certified by the State DOT or subject to the approval of the Owner and Engineer.
- B. Bar Identification and Mill Test Reports - All reinforcing bars shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade.
- C. Concrete testing shall be performed prior to and during placement.

PART 2 PRODUCTS

2.01. FORMWORK

- A. Form materials shall be new wood, new plywood, or steel. Worn, used forms will not be allowed on exposed work.
- B. Chamfer forming strips for exposed edges and outside corners of concrete shall be formed with 3/4-inch by 3/4-inch chamfer forming strips.
- C. Forms shall be coated with a release agent which will not stain concrete or absorb moisture.
- D. Form Ties
 - 1. Form ties shall leave no metal closer than 1-inch to the surface of the finished concrete. The ends of the form ties shall create cone-shaped tie holes for sealing with plug mortar.
 - 2. Snap ties without cone-shaped ends that leave metal exposed at surface can only be used at unexposed areas of foundation walls and retaining walls.

2.02. REINFORCING STEEL

- A. Deformed Reinforcing Bars - ASTM A615, Grade 60.
- B. Threaded rebar splicing system shall be a fabricated assembly with a mechanical splice capable of developing 125 percent of the specified yield strength (75 ksi for Grade 60 bars).
- C. Use Barsplice Products, Inc. "BPI Barsplicer System," ERICO "Lenton Form Saver," Dayton Superior "Threaded Splicing Systems," or equal.
- D. Welded Wire Reinforcement (WWR) - ASTM A1064 for plain or deformed wire, supplied in flat sheets only.
- E. Bar Supports and Bolsters
 - 1. Bar supports and bolsters shall be a non-bleeding and non-staining material where concrete surfaces remain exposed. Plastic, plastic tipped, or stainless steel bar supports shall be used for this purpose.
 - 2. Bar supports bearing on grade, insulation, or fill material shall be continuous runner type supplied with continuous welded on plates, or minimum 4000 psi precast concrete blocks specifically cast for this intended use to assure proper support of reinforcement. Individual high chair supports will not be considered adequate.

The use of pavers, brick, or concrete masonry units (CMU) to support reinforcement shall not be permitted.

2.03. CONCRETE

- A. Concrete Classes and Their Use
 - 1. Mix A - All general uses not otherwise specified or provided for below.

2. Mix E - Sidewalks, road curbs, exterior slabs. (This mix can be utilized for all Mix A applications if requested by Contractor.)

Mix	28-Day Compressive Strength (psi)	Coarse Aggregate Size per ASTM C33	Minimum Total Cementitious Content (lbs/CY)	Maximum Water/Cement Ratio (w/c) ⁽¹⁾	Air Content % ⁽²⁾	Maximum Water-Soluble Chloride Ion (CL ⁻)
A	4,000	#57	550	0.45	6.0	0.30
E	5,000	#57	600	0.40	6.0	0.15

- (1) These maximum water/cement ratios shall be considered for selection of supplier's mix designs. The water/cement ratio specified in the approved mix designs shall be the maximum used in production.
 (2) Tolerance for air content is $\pm 1-1/2$ percent.

- B. All concrete shall be air-entrained as specified in the above chart.
- C. For interior concrete, where finishes require a lower air content than specification requires, the air content shall be adjusted accordingly with the approval of the Engineer.
- D. Without plasticizers, concrete slump for flatwork shall not exceed 3 inches. Wall concrete and other vertical placements (without plasticizers) shall be placed with a maximum slump of 4 inches.
- E. Concrete with superplasticizer shall be designed for a target slump of 6 inches. Mixed concrete with a slump greater than 7 inches shall not be placed on this project.

2.04. MATERIALS

- A. Cement shall be Portland cement Type I or Type II and shall conform to ASTM C150.

B. Pozzolans

1. Fly ash shall meet the requirements of ASTM C618 Class F, except as modified below:

- a. Loss of Ignition, Maximum - 5.0 percent.
 b. Maximum Retained on #325 Sieve - 30 percent.

A blend of Portland cement and fly ash shall be between 15 to 25 percent of total cementitious content.

2. Blastfurnace slag shall meet the requirements of ASTM C989 and be specifically manufactured to produce higher concrete strengths and provide greater resistance to chloride penetration and sulfate attack.

A blend of Portland cement and ground iron blastfurnace slag shall contain no more than 50 percent slag. The resulting blend of cementitious material shall meet the requirements of ASTM C595.

C. Aggregates

1. Fine Aggregate (Sand)
 a. Natural or manufactured siliceous sand.

- b. Quantity of deleterious substances as approved by State DOT or as limited by Table 1 of ASTM C33.
 - c. Graded within the limits of ASTM C33.
2. Coarse Aggregate
- a. Crushed stone or crushed gravel.
 - b. Quantity of deleterious substances as approved by State DOT or as limited by Table 3 of ASTM C33 for Class 3S aggregates.
 - c. Graded within the limits of ASTM C33.
3. Five cycle soundness tests for fine and coarse aggregates shall meet the requirements of ASTM C33.

PERCENT LOSS

	MAGNESIUM SULFATE	SODIUM SULFATE
Fine aggregate ⁽¹⁾	15	10
Coarse aggregate ⁽²⁾	18	12

- (1) If provided results of soundness tests exceed these limits, it would be acceptable to provide a certified letter attesting to the favorable performance of the fine aggregates as outlined in ASTM C33, Article 8.
- (2) Soundness tests for coarse aggregates do not need to be provided if they are approved by State DOT for use with concrete. Submit verification of such.

4. Source of fine and coarse aggregates shall not have a history pertaining to alkali-aggregate reactivity or shall be tested to show aggregates are not reactive. In the event that aggregate source with potential alkali-aggregate reactivity is unavoidable, at least two of the following measures shall be taken to minimize this reaction:
- a. Provide low alkali cement (<0.60 percent alkalies).
 - b. Use lithium-based additives.
 - c. Use fly ash (minimum 20 percent content) or slag (minimum 40 percent content).
- D. Mixing Water - Clear and potable per ASTM C1602.
- E. Acceleration admixtures are only allowed to shorten cold weather protection periods.

2.05. ADMIXTURES

- A. General - Admixtures other than those specified may only be used after written approval by the Engineer.
- B. Admixtures shall be as manufactured by BASF Chemical Company; Sika Corporation; Euclid Chemical Company; W.R. Grace, Inc.; or equal.
- C. Air Entrainment Admixture - All concrete shall contain an air entrainment admixture meeting the requirements of ASTM C260.

- D. Water Reducing Admixture - All concrete shall contain a water reducing admixture that meets the requirements of ASTM C494 Type A (water reducing) or Type F (superplasticizer). This admixture shall not contain chlorides.
- E. Retarding Admixture - If air temperatures are expected to exceed 85 degrees F during the placement and/or finishing of any flatwork, a retarding admixture shall be used that meets the requirements of ASTM C494 Type D.
- F. Evaporation Reducer - For all concrete flatwork during hot and/or windy weather conditions, apply to freshly placed concrete prior to finishing. Use BASF Chemical Company "Confilm," L&M Construction Chemicals "E-Con," Conspec (by Dayton Superior) "Aquafilm," or equal.
- G. Acceleration admixture shall meet the requirements of ASTM C494, Type C, and shall not contain calcium chloride. Acceleration admixture is only allowed for placing concrete during cold weather conditions.

2.06. OTHER PRODUCTS

- A. Bonding Agent - For all equipment and housekeeping pads, and when placing freshly-mixed concrete against existing hardened concrete, use a corrosion inhibiting, non-vapor barrier, extended open time bonding compound.

Use Sika Corporation "Armatec 110 EpoCem," Euclid Chemical Company "Duralprep A.C.," BASF Chemical Company "Emaco P24," or equal.

- B. Patching Grout.

1. Patching Grout shall be a polymer-modified Portland Cement, trowel grade mortar specifically manufactured for use as a patching and repair material.
2. Provide materials manufactured for exterior exposure and for use in sanitary sewage treatment related structures.
3. Available Products:
 - a. "SikaTop" by Sika Corp.
 - b. "Duropatch VOH" by L&M Construction Chemicals.

- C. Liquid curing compound shall only be used during cold weather conditions and curing of foundation wall strip footings. When allowed, use a dissipating, VOC-compliant, water-based membrane forming with fugitive dye, conforming to ASTM C309, Type 1-D. Curing compound shall be applied at twice the manufacturer's recommended application rate.

Use Euclid Chemical Company "Tammsecure WB 30D," SYMONS Corporation "Resi-Chem Clear Cure 1D," W.R. Meadows, Inc. "1100-Clear" (with optional fugitive dye), or equal.

- D. Slab sealer shall be Sika Corporation "Sikagard 701W," Euclid Chemical Company "Euco-Gard 100," BASF Chemical Company "Enviroseal 20," or equal.
- E. Adhesive waterstop shall be used where shown on the Drawings for new concrete cast against hardened concrete.

Provide a premolded 1-inch by 3/4 inch asphaltic plastic non expansive self-adhering waterstop strip, applied with primer adhesive.

Waterstop and adhesive shall be "Ultrastop" by Vinylex or equal.

- F. Expansion and isolation joint filler shall be preformed, closed cell, high grade polyethylene or non-extruding PVC, such as "Expansion Joint Filler" by BASF Chemical Company; "Plastic Expansion Board" by Westec Barrier Technologies; "Deck-O-Foam" by W.R. Meadows, Inc.; or equal.
1. Joint fillers shall be held back for sealants.
 2. The joint filler shall be compatible as a back-up material, with regard to the sealant not bonding to or being stained by the backup.
- G. Joint sealant shall be as specified in Section 07900, Joint Sealers.
- H. Non-Shrink Grout - Shall be a fluid or flowable non-gas liberating cement base product which is manufactured premixed, requiring only the addition of water at the job site. All components shall be inorganic.

Non-shrink grout (mixed as a plastic state) shall have a minimum compressive strength of 5,000 psi in seven days and 7,000 psi in 28 days.

PART 3 EXECUTION

3.01. FORMS

- A. Earth cut forms shall not be used; sides of all footings, slabs, etc., shall be formed.
- B. Contractor is responsible for design and bracing of all forms for strength, integrity, and to produce the desired tolerances and finishes.

3.02. TOLERANCES FOR FORMED SURFACES

- A. Tolerances apply to concrete dimensions only, not to positioning of reinforcing steel or cast-in/embedded items.

1. Variation from plumb:	
a. In the lines and surfaces of piers, walls, and other vertical members:	1/4 inch
b. For exposed corners of walls and piers, construction/control joint grooves, and other conspicuous vertical lines:	1/4 inch
2. Variation from level or from grades specified:	
a. Along tops of walls, slab edges, and other conspicuous horizontal lines:	1/4 inch
3. Variation of the linear building lines (lines of structures) from position in plan and related position of piers, walls, and partitions:	1/2 inch
4. Variation in the sizes and location of sleeves, floor openings, and wall openings:	+1/4 inch
5. Variation in cross-sectional dimensions of piers and in the thickness of slabs and walls:	-1/4 inch +1/2 inch
6. Footings and thickened edges of slabs:	
a. Variations in dimensions in plan:	-1/2 inch +2 inches
b. Misplacement or eccentricity:	
• 2 percent of the footing width in the direction of misplacement but not more than 2 inches	
c. Thickness:	
• Decrease in specified thickness	5 percent
• Increase in specified thickness. No limit but increased thickness must be maintained for minimum 5 feet 0 inch length	

3.03. CONCRETE COVER

- A. Clear concrete cover not indicated on Drawings shall conform to ACI 318. However, in no case shall the clear cover be less than 1-1/2 inches.
- B. Contrary to the practice permitted by CRSI, the use of brick or CMU block supports for reinforcement shall not be permitted. Only special made wire or plastic bar supports or special cast, precast concrete blocks shall be allowed.
- C. All metal and plastic bar supports bearing on grade shall have continuous runners to prevent settlement during construction activities.

3.04. CLEANING

- A. Prior to concrete deposition, reinforcing steel shall be free from mortar, mud, loose mill and rust scale, grease, oil or any other coatings, including ice, that would destroy or reduce bond with the concrete.

3.05. PREPARATION, MIXING, AND HANDLING OF CONCRETE

- A. Batch Plant Requirements - Measurement of materials at the batch plant shall be in accordance with ASTM C94.
- B. Mixing Methods - All concrete shall be ready mixed to meet the requirements of ASTM C94.
- C. A written delivery slip or ticket, prepared and signed by the plant operator shall be made out at the proportioning plant for each truck load batch. Each slip shall show the following information:
 - 1. Truck number.
 - 2. Date and time truck is batched.
 - 3. Ticket number.
 - 4. Mix designation of concrete (per paragraph 2.03.A).
 - 5. Cubic yards of concrete.
 - 6. Cement brand, type, and weight in pounds.
 - 7. Weight in pounds of each size and type of aggregate.
 - 8. Admixtures, brand and weight in pounds and ounces.
 - 9. Moisture content of fine and coarse aggregates.
 - 10. Water added to the batch at the plant.
 - 11. Water added to the batch during transport.
 - 12. Water added to the batch at the job site.

The driver shall record the number of gallons of water added during transport and at the job site. In no case shall the w/c ratio be exceeded.

Any truck delivering concrete to the job site without a delivery slip will be rejected and shall immediately depart from the job site.

- D. Heating and Cooling of Materials - The batch plant shall be equipped to heat aggregates and water, or cool water with ice, and cool aggregates by shading and/or spraying with cool water to obtain acceptable concrete delivery temperatures in the range of 55 to 85 degrees F. Aggregates shall not contain ice or have frozen lumps nor shall they be heated to a temperature over 120 degrees F.

3.06. EMBEDMENTS IN CONCRETE

- A. Install and secure all cast-in components in accordance with manufacturer's recommendations, prior to concrete placement.
- B. Embed no pipes other than electrical conduit in structural concrete.

Obtain approval from Engineer for any variation from the following requirements unless shown on the Drawings. Make request in writing accompanied by suitable sketch.

1. Do not cut or displace any reinforcement.
2. Do not place conduit between concrete surfaces and reinforcement.
3. Restrict O.D. of conduit to 1/4 of slab thickness. Keep within middle half of that thickness.
4. Place parallel conduits apart at least six times O.D. of conduit being used.
5. Conduits that cross must be bent such that they cross between 45 and 90 degrees from each other.
6. Conduits that cross can touch each other, but no more than three conduits can cross at any given location.

3.07. CONCRETE PLACEMENT

- A. The Contractor shall notify the Engineer (and Special Inspector when required) a minimum of 48 hours in advance of placement to allow sufficient time for inspection and for any corrective measures which are subsequently required.
- B. Concrete shall be placed in accordance with ACI 304 and ACI 318.
- C. Concrete shall be placed and vibrated in lifts not exceeding 30 inches.
- D. Curing and protection of the concrete shall begin immediately after completion of the finishing operation.
- E. Adjacent concrete placements (sections) shall not be placed any sooner than three days since newly cast sections.

3.08. FORM REMOVAL

- A. The Contractor shall assume full responsibility for the strength of all components from which forms are removed.

- B. Forms and supports shall remain undisturbed until the concrete has attained sufficient strength to support its own weight in addition to any anticipated loads (temporary or permanent) that may be placed upon it during subsequent work. In no event shall forms be loosened or removed prior to 24 hours' wet cure time. Re-shore at midspan/mid-height where necessary.
- C. Vertical forms such as wall forms may be removed at any time after 24 hours, provided that stripping does not damage surfaces and such action does not endanger any part of the structure. Coordinate timing of form removal with rub finish requirements.
- D. Residue of the form release agent shall be completely cleaned off the concrete surface.

3.09. FINISHING

- A. The finish of all walls and slabs (vertical and horizontal surfaces, respectively) shall be as described below and in accordance with the schedules at the end of this Article.
- B. As-Cast Wall (Vertical) Finishes
 - 1. Type I - Rough Form Finish - Tie holes and defects shall be filled with patching mortar. Fins exceeding 1/4 inch in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imprinted by the forms.
 - 2. Type II - Smooth Form Finish - The form facing material shall produce a smooth, hard, uniform texture on the concrete.

Tie holes and defects (including bugholes) shall be patched with a grout rubbing mixture as defined below for Type IV finish. All fins shall be completely removed.
- C. Rubbed Wall Finishes - The following finishes shall be produced on concrete with a Type II smooth form finish. Where a rubbed finish is to be applied, the forms shall have been removed and necessary patching completed.
 - 1. Type III - New Concrete, Smooth Rubbed Finish - New concrete is defined here as concrete less than seven days old.
 - a. The finishing shall be applied no later than the day following form removal (green concrete maximum seven days old). Surfaces shall be wetted and rubbed with a carborundum brick until uniform color and texture are produced.
 - b. No cement grout shall be used other than the cement paste drawn from the concrete itself by the rubbing process. Delayed application of Type III finish will not be accepted. A Type IV finish will be required.
 - 2. Type IV - Old Concrete, Grout-Cleaned Rubbed Finish - Old concrete is defined here as concrete over seven days old that cannot be "green rubbed."
 - a. The walls shall have previously received a Type II finish. This finish will not hide projections caused by form slippage and alignment problems.
 - b. Large areas more than 12 feet high or 24 feet long shall be marked off with chalk lines to produce a uniform overall pattern.

- c. A grout rubbing mixture shall be 1 part Portland cement and 1 1/2 parts fine sand mixed to a stiff masonry mortar consistency.

The sand and the Portland cement shall be obtained from the concrete plant where the concrete was purchased and shall be the same as used in the concrete.

- d. The surface shall be soaked with water. The surface being worked on shall not be in direct sunlight while finishing. Curing in direct sunlight is acceptable.
- e. Immediately after soaking, apply the grout rubbing mixture with a rubber or cork float. The material is spread to form a paste over the area being worked on.

The applicator shall always work to a wet edge.

If the area starts to visually lighten up or dry, water can be added by shaking a wetted brush onto the surface.

The coated area shall be permitted to set similar to waiting for a concrete floor to set.

- f. The applicator shall use a carborundum brick to vigorously work the material in a circular motion to a smooth rubbed finish. It is not intended to leave a thin grout coating, or a "swirl" or "fan" pattern in the surface.
- g. Should the mixture start to dry out or get too stiff to work, the applicator may re wet the wall with either a pump or brush.
- h. When the area is complete, it will be smooth and dark to medium grey in color. The smooth surface will be equal to a medium grade of sand paper with no evidence of patterns or individual rubbing strokes. No globs of excess material shall remain.
- i. Spray surface with liquid curing compound.
- j. When viewed from a distance about 10 to 20 feet, the concrete will appear to be a uniform grey, creamy smooth surface.

D. Slab Finishes - The finish of all slabs and horizontal surfaces shall be as described below:

- 1. Type A - Floated Finish - After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Preferably a magnesium float will be used.

Floating shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10-foot straightedge.

If water has been brought to the surface by the rough floating operation, additional floating shall not proceed until this water has evaporated.

The slab is further floated, with all high spots cut down and all low spots filled during this procedure. The slab shall be finish floated to a uniform sandy texture.

2. Type B - Troweled Finish - The surface shall first receive a Type A floated finish. It shall then be power troweled and finally hand troweled for thorough consolidation. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall produce a ringing sound as the trowel is moved over the surface.

The finished surface shall be essentially free of trowel marks, uniform in texture and appearance.

3. Type C - Broom Finish - First, finish the concrete with a Type A floated finish. The concrete shall be given a transverse scored texture by drawing a coarse broom across the surface, perpendicular to the line of travel along the walking surface.

E. Finish Schedules

TABLE 03001-1

WALL (VERTICAL) FINISHES

Type I	Rough Form Finish - All concrete not exposed to view including below-grade walls.
Type II	Smooth Form Finish - All other concrete without a specified finish.
Type III ⁽¹⁾ (Exterior)	Smooth-Rubbed Finish - Exterior exposed-to-view concrete wall areas. This finish shall be carried to a minimum of 6 inches below finished grade.
Type III ⁽¹⁾ (Interior)	Smooth-Rubbed Finish - Interior exposed-to-view concrete wall areas, piers, equipment supports and pads, curbs, and housekeeping pads.

(1) Unacceptable Type III finish areas shall be refinished with a Type IV grout-cleaned rubbed finish.

TABLE 03001-2

SLAB (HORIZONTAL) FINISHES

Type A	Floated Finish - At tops of walls and footings, and for surfaces to receive a Type C broom finish.
Type B	Troweled Finish - For all horizontal surfaces (including slabs) not indicated to receive other finish.
Type C	Broom Finish - For sidewalks and other exterior walking surfaces.
Concrete Floor Sealer	Seal interior and exterior exposed-to-view slabs (floors), sidewalks, etc.

3.10. CONCRETE EQUIPMENT AND HOUSEKEEPING PADS

- A. If sizes are not shown on the Drawings, provide concrete pads 6 inches wider than the approved equipment in all directions.
- B. Prior to placing concrete for equipment pads, apply a bonding agent.
- C. The sides and top of the equipment pad shall be finished similar to a Type III or Type IV rubbed wall finish and Type B troweled finish, respectively.
- D. All interior pads and all exterior frost-protected pads shall be placed by the General Contractor.

3.11. CURING AND PROTECTION

- A. All freshly placed concrete shall be protected from adverse weather elements, and from defacement. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for providing sufficient water for hydration and preventing loss of moisture from the concrete for at least a seven-day period.
- B. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on newly cast concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the curing period.
- C. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.
- D. Walls and Other Vertical Members
 - 1. Immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moisture for at least the first 24 hours. The forms shall be intermittently re-moistened and the concrete shall remain tightly formed and covered thereafter for a total curing period of at least seven days.
 - 2. If wall or other vertical forms are left in place for the entire seven-day cure, the forms can be loosened only after 24 hours to allow water to soak the sides of the concrete. If forms are loosened, continuous moisture shall be provided for the entire seven-day curing period.
 - 3. If forms are removed in less than seven days, the vertical surfaces shall be sprayed with water and tightly sealed with polyethylene or burlap combined with continuous water spray for the remainder of the seven-day period.
 - 4. If patching and finishing is done after the seven-day curing is completed, the vertical surfaces shall be further cured by immediately spraying the entire surface with a heavy coating of liquid curing compound.
- E. Slabs and Other Flatwork
 - 1. After finishing and immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, spray the surface with water to provide continuous moist curing for at least the first 24 hours.
 - 2. After the initial 24-hour period, soak with water and cover for an additional six days with white polyethylene blankets. Wet burlap coverings may be used if the burlap is kept wet by continuous sprinkling with water. Lap the cover material at least 12 inches, covering the top and sides of the concrete.
 - 3. If cover material is not used, the concrete surfaces shall be kept continuously wet by spraying or other approved methods.
- F. Strip Footings (Supporting Foundation Walls)
 - 1. After finishing, apply curing compound at twice the manufacturer's recommended application rate.
 - 2. Curing compound shall be applied to and seamlessly cover all exposed surfaces.

- G. During hot weather conditions (defined in ACI 305), provide curing procedures as outlined above along with additional provisions required by ACI 305.
- H. During cold weather conditions (defined in ACI 306) where heated enclosures are provided or when continuous moist curing of walls and slabs is not practical, use liquid membrane forming curing compounds with fugitive dye, applied at twice the manufacturer's standard rate of application.

3.12. SEALING OF CONCRETE

- A. The concrete surfaces identified in the Finish Schedule shall be sealed as follows:
 - 1. Prior to applying floor sealer, thoroughly clean the concrete surface to remove all dirt, oil, grease, and other foreign matter with caustics and detergents.
 - 2. Thoroughly rinse and apply two coats of sealer in accordance with manufacturer's recommendations.
 - a. The first coating shall be applied as soon as possible after finishing and curing.
 - b. The second coating shall be applied near project completion after installation of all equipment and piping and after completion of other related construction activities.

3.13. TESTING FOR QUALITY ASSURANCE

- A. The Owner shall hire and pay for the services of an independent testing laboratory to perform the testing for quality assurance.
- B. This testing shall consist of calculation of w/c ratio; measuring slump; air content; and tests for the compressive strength. Four 6-inch diameter cylinders shall be made with 1 cylinder to be tested at 7 days, 2 cylinders to be tested at 28 days, and 1 cylinder to be tested at 56 days if the 28-day strengths are inadequate. These test results will be used by the Contractor to assist his control of quality.
- C. The Contractor shall schedule and provide 48 hours' notice to the independent testing laboratory. The Contractor shall provide free access to work and cooperate with the testing laboratory.
- D. In general, testing shall be required for each placement.
- E. Copies of all test reports shall be mailed directly to the Owner and Engineer by the testing laboratory as soon as they become available.
- F. The Contractor shall accept all test results reported by the testing laboratory. Any disputed results shall be validated by an independent testing laboratory hired by the Contractor at their expense. Regardless of additional test results, the Contractor will not be reimbursed.

3.14. REPAIR OF NEWLY CAST OR DAMAGED CONCRETE

- A. Areas of concrete in which cracking, spalling, or other signs of deterioration develop during initial curing or thereafter until the end of the guarantee period shall be removed and replaced, or repaired in accordance with this Article.

Existing concrete components and surfaces damaged during construction operations shall be repaired in accordance with this Article.

The Contractor may propose to use a specific method most suitable to the situation and have the method approved by the Engineer prior to repair. The Contractor shall submit manufacturer's product data sheets and recommended application procedures to the Engineer for approval prior to performing repairs.

- B. Structural Cracks (as determined by Engineer) - Random shrinkage or structural cracks shall be repaired utilizing a low viscosity, 100 percent solids, two-component epoxy resin system.

Crack or void must be dry at time of application. Remove all dust, debris or disintegrated material from crack or void by use of oil-free compressed air or vacuuming or by other approved methods as may be required by manufacturer. After successful crack repair, remove temporary seal and excess adhesive. Clean surfaces adjacent to repair and blend finish.

Surface preparation, mixing, and application shall be in conformance with manufacturer's recommendations.

- C. Leaking and/or Active Cracks (that are not structural cracks) - Leaking and active cracks shall be repaired utilizing a low viscosity, hydrophobic, closed cell polyurethane foam injection system.

Inject water into the crack to thoroughly flush out the crack and remove dirt, dust, and contaminants. Follow flush water by injecting urethane foam with accelerating catalyst as required. After successful crack repair, continue wall preparation by removing injection ports and grind to remove excess injection material and surface seal. Patch port holes and blend concrete finish with surrounding area.

Surface preparation, mixing, and application shall be in conformance with manufacturer's recommendations.

- D. Excessive surface cracking in concrete slabs as defined herein shall receive a penetrating epoxy resin sealer to mend and seal the cracks.

Excessive cracking shall be defined as areas containing "craze cracking" or "map cracking" as defined by ACI 201.1. In the event that excessive cracking occurs in isolated areas of a given concrete slab, sealer could only be required in the area of the cracks bounded by construction or control joints pending Engineer approval.

Surface preparations, priming, mixing, application, and finishing shall be in accordance with the manufacturer's recommendations.

Epoxy resin penetrating sealer shall be "Sikadur 55 SLV" by Sika Corporation, or equal.

- E. Damaged (spalled, weakened, or disintegrated) concrete and areas of honeycomb shall be removed to sound concrete and shall be repaired.

For spalled or honeycomb areas involving depths generally less than 3 inches, utilize a polymer-modified cementitious repair mortar, such as Sika Corporation "Sikatop 122 or 123," Euclid Chemical Company "Verticoat," BASF Construction Chemicals "HB2 Repair Mortar," or equal.

Surface preparation, mixing, priming, and application shall be in conformance with manufacturer's recommendations.

F. Substrength Concrete

1. Concrete which fails to meet the strength requirements as outlined above in Article 3.13 will be analyzed by the Engineer as to its adequacy based upon design loading and exposure conditions for the particular area of concrete in question.
2. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at his expense. The method of strengthening or extent of replacement shall be as defined by Engineer.
3. Concrete not requiring strengthening but still falling below the strength requirements, may be accepted by the Owner in accordance with the General Conditions, specifically the paragraph entitled "Acceptance of Defective Work."

- G. Inadequate Air Content - Concrete which will be exposed to freeze-thaw cycles when in service, and which is found to have inadequate air content, shall be replaced to the extent defined by the Engineer.

3.15. REPAIR AT SAW CUTS TO CONCRETE

- A. After saw cutting concrete, repair exposed rebar as follows:
1. Chip back concrete around rebar end with maximum 20-lb. chipping hammer.
 2. Cut off exposed rebar minimum 1-1/2 inches past concrete surface.
 3. Coat area with bonding agent and patch hole with non-shrink grout.

3.16. REPAIR TO REMOVED ANCHOR BOLTS

- A. Existing exposed anchor bolts that are no longer used shall be removed.
1. Anchor bolts that can be pulled out shall be patched with non-shrink grout.
 2. Anchor bolts that cannot be pulled out shall be cut off and patched in the same manner as the repair of exposed reinforcement in saw cut concrete (indicated above).

END OF SECTION

SECTION 05001

MISCELLANEOUS AND ORNAMENTAL IRON - GENERAL
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 FILED SUB-BID REQUIREMENTS

- A. The work to be done under this classification is included in the following drawings and a sub-bid shall be submitted for the entire work covered in the following specifications and Drawings:
1. General Conditions
 2. Section 01010 – SUMMARY OF WORK
 3. Section 01019 – CONTRACT CONSIDERATIONS
 4. Section 01039 – COORDINATION
 5. Section 01300 – SUBMITTALS
 6. Section 01380 – CONSTRUCTION DOCUMENTATION
 7. Section 01400 – QUALITY CONTROL
 8. Section 01500 – TEMPORARY FACILITIES
 9. Section 01600 – MATERIALS AND EQUIPMENT
 10. Section 01700 – RECORD DOCUMENTS
 11. Section 05500 – METAL FABRICATIONS as relates to handrails, ladders, and bollards.
 12. Section 05510 – POST-INSTALLED CONCRETE AND MASONRY ANCHORS as relates to handrails, ladders, and bollards.
 13. Section 05521 – PIPE AND TUBE RAILINGS
 14. Drawings including S001, S101 and S102
- B. The Instruction to Bidders, Bid Forms, Agreement, General Conditions, and complete Specifications are hereby made a part of these specifications and the subcontractor shall consult them in detail for instructions. Specific subcontractor shall conform to Article 6 of the Standard General Conditions as they relate to the subcontractor's work as identified in this Section. In particular, subcontractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, and hoisting and staging required for the performance of filed sub bidder's work.

- C. The work of this Section is based on:
 - 1. Specifications and Drawings indicated above.
 - 2. Work shown on the General (G) Drawings.
 - 3. Sub-bidder shall refer to General Drawings for symbol and abbreviation definitions as needed.

- D. In accordance with M.G.L. Chapter 149, Sections 44A through 44J, the Engineer hereby declares that all of the work of this Section shall be estimated under the appropriate Item of the Bid Form and that each sub-bidder on this work shall submit a bid and bid security to the Town of Wareham prior to the time specified in the Invitation to Bid and at that time and place bids will be publicly opened and read aloud.

- E. Details of the procedure for filing sub-bids are contained in the Instruction to Bidders.

1.02 RELATED SECTIONS

- A. All Division 01 specifications are considered to be related sections to the filed sub-bidders scope of work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

A. Section Includes:

- 1. Structural steel.

B. Related Sections:

- 1. Section 03001 - Place Concrete for non-shrink grout.
- 2. Section 05500 - Metal Fabrications for steel lintels and shelf angles not attached to structural-steel frame not defined as structural steel.

1.03. DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.04. SUBMITTALS

A. Product Data: For each type of product indicated.

- 1. Structural-steel materials.
- 2. High-strength, bolt-nut-washer assemblies.
- 3. Anchor rods.
- 4. Galvanized repair paint.
- 5. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

- 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
- 2. Include embedment drawings.
- 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

1.05. QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with applicable provisions of the following specifications and documents:
 1. AISC 303.
 2. AISC 360.
 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 fasteners and for retesting fasteners after lubrication.

1.07. COORDINATION

- A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 PRODUCTS

2.01. CONNECTION DESIGN INFORMATION:

- A. Option 1: Connection designs have been completed and connections indicated on the Drawings.
- B. Construction: Braced frame.

2.02. STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.

- B. Channels, Angles, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C, structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
 - 1. Finish: Galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.03. BOLTS, CONNECTORS, AND ANCHORS

- A. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 compressible-washer type with mechanically deposited zinc coating finish.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- C. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A63 heavy-hex carbon steel.
 - 2. Washers: ASTM F436, Type 1, hardened carbon steel.
 - 3. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- D. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

2.04. FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Fabricate beams with rolling camber up.
 - 2. Mark and match-mark materials for field assembly.
 - 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.05. SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.06. GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize shelf angles attached to structural-steel frame and located in exterior walls.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.03. ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Do not use thermal cutting during erection.
- F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04. FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.

3.05. REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

3.06. FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
1. Verify structural-steel materials and inspect steel frame joint details.
 2. Verify weld materials and inspect welds.
 3. Verify connection materials and inspect high-strength bolted connections.

END OF SECTION

SECTION 05310

STEEL DECK

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. This Section includes the following:
 - 1. Composite floor deck.
- B. Related Sections include the following:
 - 1. Division 03 - Concrete
 - 2. Division 05 Section - Metal Fabrications for framing deck openings with miscellaneous steel shapes.

1.03. SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Research Reports: For steel deck, from ICC-ES.

1.04. QUALITY ASSURANCE

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Deck:
 - a. Nucor Corp.; Vulcraft Division.
 - b. Roof Deck, Inc.
 - c. United Steel Deck, Inc.
 - d. Or approved equal.

2.02. COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 2. Profile Depth: 1-1/2 inches.
 - 3. Design Uncoated-Steel Thickness: 0.0474 inch.
 - 4. Span Condition: As indicated.

2.03. ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design, uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Galvanizing Repair Paint: ASTM A780.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02. INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Locate deck bundles to prevent overloading of supporting members.
- C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.03. COMPOSITE FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 5/8 inch, nominal.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.04. FIELD QUALITY CONTROL

- A. Field welds will be subject to inspection in accordance with Engineer and Owner requirements.
- B. Remove and replace work that does not comply with specified requirements.

3.05. REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

A. Section Includes:

- 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- 2. Metal bollards.
- 3. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- 4. Metal Ladders.
- 5. Portable Davit Cranes: two (2) manually operated, 2000 lb capacity, portable davit crane, with two (2) pedestal mount bases.

B. Products furnished, but not installed, under this Section:

- 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections:

- 1. Section 03001 - Concrete for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
- 2. Section 05521 - Pipe and Tube Railings.

1.03. SUBMITTALS

A. Product Data: For the following:

- 1. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

- 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.04. QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.05. PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.06. COORDINATION

- A. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, licensed in the State of Massachusetts, to design ladders.
- B. Structural Performance of Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F ambient; 180 deg F, material surfaces.

2.02. METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.03. FERROUS METALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Steel Tubing: ASTM A 500 Gr. C, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

- G. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
 - 1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
- I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.04. NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.05. FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- E. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- F. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
- G. Eyebolts: ASTM A 489.
- H. Machine Screws: ASME B18.6.3.
- I. Lag Screws: ASME B18.2.1.
- J. Plain Washers: Round, ASME B18.22.1.

- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- M. Post-Installed Anchors: Comply with Specification Section 05510 - Post-Installed Concrete and Masonry Anchors.
- N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.06. MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete: Comply with requirements in Section 03301 - 1 Concrete for normal-weight, air-entrained, concrete.

2.07. FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.08. MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports.

2.09. METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
- B. Galvanize steel bollards.
- C. Provide Safety Yellow plastic bollard covers.

2.10. LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

2.11. METAL LADDERS

A. General:

1. Comply with ANSI A14.3.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- diameter, steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung by coating with abrasive material metal-lically bonded to rung.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Harsco Industrial IKG, a division of Harsco Corporation.
 - 2) Ross Technology Company.
 - 3) W.S. Molnar Company.
6. Source Limitations: Obtain nonslip surfaces from single source from single manufac-turer.
7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
8. Galvanize exterior ladders, including brackets.

2.12. DAVIT ARM AND MOUNTING BASES

A. General: Provide two (2) portable davit cranes, with two (2) pedestal mounted mounting ba-ses as follows:

1. Capacity: 2000 lbs.
2. Winch: Manual, worm gear with drill drive.
 - a. Provide two (2) drill drives total.
3. Boom: four position adjustable boom and ratchet angle adjustment.
4. Mast: Able to rotate 360 degrees.
5. Base: pedestal mount.
6. Wire Rope Assembly: 1/4 inch diameter stainless steel wire rope with swivel hook end fitting.

7. Finish: 316 Stainless Steel.
- B. Coordinate wire rope length with the Drawings and with approved manufacturer' shop drawings of all pertinent equipment.
 1. Available Manufacturers:
 - a. Thern, Inc., Portable Davit Crane: Commander 2000.
 - b. Approved equal.

2.13. FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14. STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

2.15. ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M12

PART 3 EXECUTION

3.01. INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.02. INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.03. INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.04. INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use non-shrink, nonmetallic grout.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.05. ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05510

POST-INSTALLED CONCRETE AND MASONRY ANCHORS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Expansion Anchors.
 - 2. Adhesive Anchors.
 - 3. Masonry Anchors.
- B. Related Sections:
 - 1. Section 03001 - Concrete, for concrete reinforcement.
 - 2. Division 5 sections for anchor rods, nuts, and washers.

1.03. DEFINITIONS

- A. Post-installed anchor: An anchor installed in hardened concrete or masonry.
- B. Expansion anchor: A post-installed anchor, inserted into hardened concrete that transfers loads to or from the concrete by direct bearing or friction or both. Expansion anchors may be torque-controlled or displacement controlled.
- C. Adhesive anchor: A post-installed anchor, inserted into hardened concrete with an anchor hole diameter not greater than 1.5 times the anchor diameter, that transfers loads to the concrete by bond between the anchor and the adhesive, and a bond between the adhesive and the concrete.

1.04. SUBMITTALS

- A. Product Data: For each type of product indicated. Catalog cuts shall be clearly marked to indicate product(s) to be used and shall include the following:
 - 1. Manufacturer's installation instructions.
 - 2. Allowable temperature range for anchor installation and curing.
- B. Certificates: ICC ES Evaluation Service Report (ESR) for proposed adhesive anchors.
- C. Installer Qualifications and Procedures: Submit a letter from the anchor manufacturer which indicates successful completion of the product installation training. Letter shall indicate the training date and a list of the personnel trained.

1.05. QUALITY ASSURANCE

- A. Installer Qualifications: Post-installed anchors shall be installed by a contractor or installer with at least three years of experience performing similar installations.
- B. Installer Training: Training shall be conducted by the manufacturer or manufacturer's representative prior to anchor installation. Training shall consist of a review of the complete installation process for all types of post-installed anchors on the project, and include the following:
 - 1. Hole drilling procedure.
 - 2. Hole preparation and cleaning technique.
 - 3. Adhesive injection technique and dispenser training/maintenance.
 - 4. Rebar dowel preparation and installation.
- C. Substitutions: Only adhesive anchor products having an applicable ICC ES Evaluation Service Report (ESR) will be considered for a substitution. Substitution requests shall include calculations, signed and sealed by a professional engineer registered in the state of Pennsylvania, that demonstrate the substitute product is capable of achieving the performance values of the specified product.

1.06. DELIVERY, STORAGE AND HANDLING

- A. Store anchors in a protected place in sealed containers with manufacturer's labels intact. Anchors may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
- B. Store anchors in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01. EXPANSION ANCHORS

- A. Available Products:
 - 1. Hilti Kwik Bolt TZ Expansion Anchor.
 - 2. DeWalt Power-Stud+ SD2 Expansion Anchor.
 - 3. Approved equal.
- B. Embedment: Use manufacturer's standard embedment unless noted otherwise on the Drawings.

2.02. ADHESIVE ANCHORS

- A. Available Products:
 - 1. Hilti HIT-HY 200 Adhesive Anchoring System.
 - 2. DeWalt Pure 110+ Adhesive Anchoring System.

3. DeWalt AC200+ Adhesive Anchoring System.
 4. Approved equal.
- B. Embedment: Minimum embedment depths are as indicated on the table below, unless noted otherwise on the Drawings.

Anchor Size	Minimum Embedment
#3 Rebar	4.00"
#4 Rebar	5.50"
#5 Rebar	7.00"
#6 Rebar	8.75"
3/8"φ Rod	4.50"
1/2"φ Rod	6.00"
5/8"φ Rod	7.75"
3/4"φ Rod	9.50"

2.03. MASONRY ANCHORS

- A. Available Products:
1. Hilti HIT HY 270 Masonry Adhesive.
 2. DeWalt AC 100+ Gold Adhesive Anchoring System.
 3. Approved equal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install post-installed anchors in accordance with manufacturer's instructions and training.

3.02. REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with epoxy bonding adhesive and high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

3.03. FIELD QUALITY CONTROL

- A. Engineer may require any or all of the post-installed anchors to be proof loaded. Tension testing shall be performed in accordance with ASTM E488. Torque shall be applied with a calibrated torque wrench.

END OF SECTION

SECTION 05521

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings.

1.03. SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04. QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.05. PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.07. COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, licensed in the Commonwealth of Massachusetts, to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02. METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.03. STEEL AND IRON

- A. Tubing: ASTM A500 (cold formed) or ASTM A513.

- B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.04. FASTENERS

- A. General: Provide the following:
 - 1. Hot-Dip Galvanized Railings: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329 for zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads. Railings indicated on the Drawings to be "Removable" shall be equipped with sleeve-type anchors such that when the railing is removed, no stud protrudes from the walking surface.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - 2. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.05. MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Non-shrink Grout: factory-packaged, nonmetallic aggregate grout, nonstaining and noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06. FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded or non-welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
 - 1. As detailed.
 - 2. By bending or by inserting prefabricated elbow fittings.
- K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- P. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Toe board shall be of an extruded profile similar to as shown on drawings.
- Q. STEEL AND IRON FINISHES
 - 1. Galvanized Railings:
 - a. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - b. Comply with ASTM A123 for hot-dip galvanized railings.
 - c. Comply with ASTM A153 for hot-dip galvanized hardware.
 - d. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - e. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

PART 3 EXECUTION

3.01. INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.02. RAILING CONNECTIONS

- A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.03. ANCHORING POSTS

- A. Anchor posts to metal or concrete surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- B. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.04. ATTACHING RAILINGS

- A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using non-welded connections.
- B. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.

3.05. ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.06. PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 05530

GRATINGS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Glass-fiber-reinforced plastic gratings.
- B. Related Sections:
 - 1. Section 05521 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.
 - 2. Section 05510 "Post-Installed Concrete and Masonry Anchors" for post installed anchors.

1.03. PERFORMANCE REQUIREMENTS

- A. The design of FRP products, including connections, shall be in accordance with governing building codes and standards as applicable.
- B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Walkways and Elevated Platforms: Uniform load of 100 lbf/sq. ft.
 - 2. Limit deflection to L/360 or 1/4 inch, whichever is less.

1.04. SUBMITTALS

- A. Product Data: For the following:
 - 1. Glass-fiber-reinforced plastic gratings.
 - 2. Clips and anchorage devices for gratings.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1.05. PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.06. COORDINATION

- A. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01. FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening FRP.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

2.02. FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.03. GLASS-FIBER-REINFORCED PLASTIC GRATINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Fibergrate Composite Structures Inc.
 - 2. Seasafe, Inc.; a Gibraltar Industries company.
 - 3. Approved equal.
- B. Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings assembled from components made by simultaneously pulling glass fibers and extruding thermosetting plastic resin through a

heated die under pressure to produce a product without voids and with a high glass-fiber content.

1. Configuration: I4015; 1-1/2-inch I-bars spaced 1 inch o.c. (40 percent open).
 2. Resin Type: Vinylester.
 - a. Flame-Spread Index: 25 or less when tested according to ASTM E 84.
 - b. U.S.D.A. Acceptance: Accepted for food processing applications.
 3. Color: Gray.
 4. Traffic Surface: Applied abrasive finish.
- C. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

PART 3 EXECUTION

3.01. INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

3.02. INSTALLING GLASS-FIBER-REINFORCED PLASTIC GRATINGS

- A. Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard stainless-steel anchor clips and hold-down devices for bolted connections.
- B. All cut ends are to be resin coated with the manufacturer's approved corrosion resistant resin.

END OF SECTION

SECTION 16001

ELECTRICAL WORK - GENERAL
(FILED SUB-BID REQUIRED)

PART 1 GENERAL

1.01 FILED SUB-BID REQUIREMENTS

- A. The work to be done under this classification is included in the following drawings and a sub-bid shall be submitted for the entire work covered in the following specifications and Drawings:
1. General Conditions
 2. Section 01010 – SUMMARY OF WORK
 3. Section 01019 – CONTRACT CONSIDERATIONS
 4. Section 01039 – COORDINATION
 5. Section 01300 – SUBMITTALS
 6. Section 01380 – CONSTRUCTION DOCUMENTATION
 7. Section 01400 – QUALITY CONTROL
 8. Section 01500 – TEMPORARY FACILITIES
 9. Section 01600 – MATERIALS AND EQUIPMENT
 10. Section 01700 – RECORD DOCUMENTS
 11. Section 02030 – DEMOLITION (as relates to electrical demolition)
 12. All Division 16 Sections
 13. Drawings including E001, and E101 through E104
- B. The Instruction to Bidders, Bid Forms, Agreement, General Conditions, and complete Specifications are hereby made a part of these specifications and the subcontractor shall consult them in detail for instructions.
- C. The work of this Section is based on:
1. Specifications and Drawings indicated above.
 2. Work shown and/or specified on the Electrical (E) drawings unless work is specifically designated to be provided by another filed sub-bidder or the General Contractor (GC).
 3. Sub-bid shall not include any earthwork or cast in place concrete work associated with ductbanks, equipment pads etc. as detailed on Electrical (E) drawings.

- 4. Sub-bidder shall refer to General Drawings for symbol and abbreviation definitions as needed.

- D. In accordance with M.G.L. Chapter 149, Sections 44A through 44J, the Engineer hereby declares that all of the work of this Section shall be estimated under the appropriate Item of the Bid Form and that each sub-bidder on this work shall submit a bid and bid security to the Town of Wareham prior to the time specified in the Invitation to Bid and at that time and place bids will be publicly opened and read aloud.

- E. Details of the procedure for filing sub-bids are contained in the Instruction to Bidders.

- F. In accordance with Massachusetts General Laws, Chapters 149 Section 44F, sub-bidders for the work of this subcontract shall list in Paragraph E of the Sub-bid Form the name and bid price of each person, firm or corporation furnishing labor or labor and materials for the class(es) of work listed below. Sub-bidder may, without listing a bid price, list his own name for any such class of work that he customarily performs with persons on his own payroll.

1.02 RELATED SECTIONS

- A. All Division 01 specifications are considered to be related sections to the filed sub-bidders scope of work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 16055
ELECTRICAL WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. General work description and requirements for electrical work included in this contract.
- B. Raceways, fittings and boxes.
- C. Conductors and accessories.
- D. Wiring devices.
- E. Grounding.
- F. Disconnect and safety switches.
- G. Nameplates and labels.
- H. Equipment testing.
- I. Spare devices.

1.02. RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK
- B. Section 01019 - CONTRACT CONSIDERATIONS
- C. Section 01026 - LUMP SUM ITEMS
- D. Section 01039 - COORDINATION
- E. Section 01300 – SUBMITTALS
- F. Section 01380 – CONSTRUCTION DOCUMENTATION
- G. Section 01400 - QUALITY CONTROL
- H. Section 01500 - TEMPORARY FACILITIES
- I. Section 01564 - EROSION CONTROL
- J. Section 01600 - MATERIAL AND EQUIPMENT
- K. Section 01700 - RECORD DOCUMENTS
- L. Section 02110 – SITE CLEARING
- M. Section 02205 - PROTECTION OF EXISTING FACILITIES

- N. Section 02222 - EXCAVATING
- O. Section 02223 - BACKFILLING
- P. Section 02228 – COMPACTION
- Q. Section 02980 – SITE REHABILITATION
- R. Section 16100 - GROUNDING
- S. Section 16161 - CONTROL PANELS AND ENCLOSURES
- T. Section 16950 - TESTING AND INSPECTION

1.03. GENERAL REQUIREMENTS

- A. All work shall be subject to applicable sections of these specifications, not necessarily the aforementioned related sections.
- B. Examination of Premises
 - 1. Before submitting a proposal, the Contractor shall examine all drawings and specifications relating to work of all trades to determine scope and relation to other work.
 - 2. Ascertain access to site, available storage, and delivery facilities.
 - 3. Before commencing work, verify all governing dimensions and examine all adjacent work at site and/or buildings.
 - 4. Some equipment or material items may be special order items having long order times and shall be ordered well in advance of installation. Unavailability due to long lead times or special orders is not an excuse for not providing the specified items.

1.04. SCOPE OF WORK

- A. The principal items of electrical work include, but are not necessarily limited to, the following:
 - 1. Provide all electrical power, lighting, control, ductbanks, systems, including exposed and concealed raceway systems, conductors, cables, fittings, wiring devices, [overcurrent protection, terminations, connections, and interconnections, and all related appurtenances to provide a complete and operating electrical system.
 - 2. Provide all system and equipment grounding in conformance with the requirements of these specifications and the National Electrical Code (NEC). See Section 16100, Grounding.
 - 3. Provide electrical labels, signs, and nameplates per this section, including conduit labeling.
 - 4. Install all electrical equipment, conduit, wire, conductors, cable, connections, etc., required for complete and operating systems.
 - 5. Coordinate work with the work of others for timely completion of the work of this contract.

6. Repair, fill and/or patch surfaces of all building components including walls, floors, ceilings, and roofs damaged or left open or bare as a result of the electrical work, including demolition.
7. Have an Owner-approved third-party inspecting agency inspect electrical installation. Submit a final certificate approving all work to the Engineer prior to final acceptance of the electrical work.
8. See paragraph 1.07 herein and Section 01700, Record Documents, for additional requirements for record drawings, operation and maintenance manual, final testing and inspection, and guarantees and warranties.
9. Provide all materials, equipment, and labor required for complete and operating electrical power distribution.
10. Provide a complete and functional standby power generation and transfer system.
11. Perform all trenching, backfilling, compaction, restoration of surfaces, dewatering (as required), ductbank fabrication, and grounding system, and electric distribution.

1.05. CODES AND STANDARDS

- A. Reference to various codes and standards are a minimum installation requirements standard. In case(s) of discrepancy between the Contract Documents and the NEC, the stricter requirement shall apply.
- B. All work, equipment, and materials furnished shall conform with the existing rules, requirements, and specifications of the Insurance Rating Organization having jurisdiction; the NEC; the National Electric Manufacturer's Association (NEMA); the Underwriters Laboratories (U.L.); and the respective utilities.
- C. All material and equipment shall bear the inspection labels of Underwriters Laboratories, unless otherwise allowed by the Engineer in writing and if the material and equipment is of the class inspected by said laboratories. All labeling shall be for the intended usage.
- D. The Electrical Contractor shall be held responsible for adherence to all rules, requirements, and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Owner or Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

1.06. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300, Submittals.
- B. The Engineer's approval shall be obtained for all equipment and material for which shop drawings are required before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. Provide submittals for all conduit, wire, cable, lighting fixtures, overcurrent devices, outlets and all other electrical equipment as listed in other Sections.

1.07. RECORD DRAWINGS

- A. In addition to the requirements of Section 01700, Record Documents regarding record drawings, prepare and submit marked-up field record drawings, which shall include all addenda items and changes made during construction, to the Engineer prior to final acceptance. Additionally, submit record drawings consisting of the following three types of drawings:
1. Elementary or Schematic Diagrams - All control schematics and elementary diagrams. Those constructed as shown on Contract Drawings need only be verified on the marked-up field set. For those that changed, submit preliminary diagrams before work on the final block diagrams is begun.
 2. Block Diagrams - Prepare and submit fully labeled block diagrams, showing all point-to-point connections giving conduit size and fill (each conductor number, size, and color listed) showing all junction boxes, pullboxes, panels, etc., together with terminal numbers at all conductor terminations. Initially, hand sketches on 8-1/2-inch by 11-inch sheets can be submitted for review. Once reviewed and approved, these designs shall be drafted on 24-inch by 36-inch sheets with suitable title block data. Block diagrams are to be updated to reflect all final connections (connections labeled) or other changes. When there is more than one sheet of block diagrams, an index shall be included to indicate on which sheet the respective pieces of equipment can be found. See sample attached to end of this Section.
 3. Contractor's As-built Drawings - Provide one 24-inch by 36-inch copies of electrical as-built drawings of the Contract Drawings with all field notes and comments to illustrate actual construction conditions. As-built drawings shall include all addenda items issued during bidding and all other changes to the documents that occurred during construction. Drawing to be titled "Contractor's As-built Drawing, Prepared by: (name of Contactor , Date Issued: _____)."
- B. Provide the final record drawings copy on 24-inch by 36-inch paper.
- C. All drawings shall be produced using the computer aided drafting system, AutoCAD, Release 2014 minimum.
- D. One reproducible (24-inch by 36-inch) drawing showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, and pullboxes shall have at least two ties.

1.08. EQUIPMENT PROTECTION

- A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. Contractor shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.
- B. During the installation of equipment, controls, controllers, circuit protective devices, etc., these items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.
- C. Damaged equipment, as determined by the Owner and/or the Engineer, shall either be repaired to new condition or replaced with new equipment.

- D. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.09. EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.

Equipment shall be installed as close as practical to locations shown on the Drawings. Where Contractor supplied equipment sizes differ from that anticipated on the Drawings, the Contractor shall prepare and submit to the Engineer new "to scale" layouts showing new equipment locations for approval.

- B. Classified Areas

1. General - Enclosures for classified areas shall be as specified in Section 16161, Control Panels and Enclosures.
2. Hazardous Areas
 - a. In the areas designated as hazardous and where explosion-proof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.
 - b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed, i.e., Class I, Division 1, Group D; Class I, Division 2, Group D atmospheres.
3. Wet Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these Specifications and of the NEC for wet locations.
4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise.

- C. Rigging and Moving Equipment - Contractor and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be employed to move any equipment over 300 lbs. or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving or placing equipment.

- D. Diagrammatic Drawings

1. Circuit diagrams shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The Contractor shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always shown or scheduled.
3. The number of conductors shown is not necessarily the correct number required. Contractor shall install as many conductors as are required for the complete and satisfactory operation of all systems.

- E. Conductor Sizing - Conductor sizes are shown for equipment branch circuits extending less than 100 feet from power source. Refer to schedule in this section for sizing conductors on circuits more than 100 feet long. Conduit sizes shall change accordingly.

PART 2 MATERIALS AND EXECUTION

2.01. RACEWAYS, FITTINGS AND BOXES

A. Raceways

1. Type A - Rigid Galvanized Steel Conduit (RGS)
 - a. Application - Unless otherwise indicated on the Contract Drawings or under this section, all wiring shall be run in Type A conduit.
 - b. Description - Hot dipped galvanized rigid steel conduit, shall conform to ASA C80-1.
 - c. Manufacturers
 - 1) Allied Tube and Conduit
 - 2) Wheatland.
 - 3) Nucor Tubular Products.
 - 4) Or Equal.
2. Type D - Rigid Non-metallic Conduit Schedule 40 (Polyvinyl Chloride [PVC])
 - a. This conduit shall be used in ductbanks.

This type conduit shall be not used for stub-ups from ductbanks. Stub-ups shall be Type D-1.
 - b. Description - Rigid, non-metallic conduit, shall be rigid PVC, Schedule 40 and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.
 - c. Manufacturers
 - 1) RobRoy Industries.
 - 2) Allied.
 - 3) Carlon
 - 4) Or Equal.
3. Type D-1 - Rigid Non-metallic Conduit Schedule 80 (PVC)
 - a. Application - For ductbank stub-ups from 24 inches below slab up to the connected devices.

- b. Description - Rigid, non-metallic conduit, shall be rigid PVC, Schedule 80, sunlight-resistant when exposed to sunlight and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.
 - c. Manufacturers
 - 1) RobRoy Industries.
 - 2) Allied Tube and Conduit.
 - 3) Carlon
 - 4) Or Equal.
4. Type F - Flexible Steel Conduit (Greenfield)
- a. Application - For final connection to lighting, heating and ventilating equipment, motors and other vibrating equipment in non-classified areas.
 - b. Description - Flexible steel conduit (Greenfield) shall be galvanized steel.
 - c. Manufacturers
 - 1) Columbia
 - 2) Porter
 - 3) Robroy Industries
 - 4) Or Equal.
5. Type G - Liquid-tight Flexible Conduit
- a. Application - For use in wet areas as final connection vibrating equipment.
 - b. Description - Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded polyvinyl chloride jacket.
 - c. Manufacturers
 - 1) RobRoy Industries.
 - 2) Anaconda
 - 3) O.Z. Gedney
 - 4) Or Equal.
6. Type G-1 - Liquid-tight, Sunlight-Resistant Flexible Conduit
- a. Application – For use in exterior areas as final connection to vibrating equipment where those connections are exposed to sunlight.

- b. Description – Liquid-tight, flexible galvanized steel case with type “UA” rating UL listed as sunlight-resistant extruded PVC jacket.
- c. Manufacturers
 - 1) RobRoy Industries).
 - 2) Anaconda.
 - 3) O.Z. Gedney
 - 4) Or Equal

B. Conduit Fittings

- 1. All Fittings – Cast-type material and coatings shall match conduit system it is to be used with.
- 2. Covers shall be of the same material as the fittings to which they are attached. Provide gaskets for exterior use and for interior wet areas.

C. Expansion Deflection Fittings

- 1. Material shall match conduit system it is to be used with, designed for 4-inch movement.
- 2. Coupling shall compensate for the following movements:
 - a. Axial expansion or contraction.
 - b. Angular misalignment.
 - c. Parallel misalignment.

D. Access Fitting and Pulling Fitting - Of the same construction as conduit fittings. Provide cover gasket for interior wet locations and exterior areas. For corrosive areas, use PVC or fiberglass boxes.

E. Boxes

- 1. Outlet and Device - Of the same construction as conduit fittings. Provide cover gasket in wet locations.
- 2. Junction and Pullboxes - Of the same construction as conduit fittings. Up to 100 cubic inches. Larger interior non-classified area boxes shall be galvanized with hinged covers. Exterior and interior wet, non-corrosive areas shall be stainless steel. Provide cover gasket in wet or corrosive locations. Provide terminal strips for joining conductors in boxes over 100 cubic inches.

F. Elbows - Factory made by same manufacturer as couplings or conduit. Material to match conduit system it is to be used with.

G. Miscellaneous

1. Nipples, Locknuts, and Bushings - Factory made; material to match conduit system it is to be used with.

H. Conduit and Core Hole Sealing - Mechanical link type with elastomeric links joined by stainless steel bolts which also serve to expand the seal. Manufacturer - Thunderline Corporation, Model "Linkseal." Shall be fire rated when used in fire walls.

2.02. CONDUCTORS AND ACCESSORIES

A. Conductors: Application - Material - Manufacturers

1. Service - Entrance Cable (in conduit)

- a. Application - For use from the point of connection to the ATS from the generator. Description - Type RHW/USE.

- 1) Conductor - Copper
- 2) Insulation Voltage Rating - 600 volts.
- 3) Insulation Material - XLP (cross-linked polyethylene) or EP.

- b. Manufacturers

- 1) Anixter
- 2) Okonite Company
- 3) Southwire
- 4) Or Equal

2. Building Wire and Cable

- a. Application - For general use for all conductor applications unless specifically called out otherwise. Not for use as service entrance cable or power distribution cable.

- b. Description - Single conductor insulated wire type as indicated below.

- 1) Conductor - Stranded copper only.
- 2) Insulation Voltage Rating - 600 volts.
- 3) Insulation Type - Type THHW/THWN for feeders and branch circuits.
- 4) Insulation Material - PVC or thermoplastic with nylon overall jacket.

- c. Manufacturers

- 1) Southwire
- 2) Anixter

- 3) Okonite
- 4) Or Equal

3. Bonding and Grounding Conductors

- a. Application - For use as needed to meet the requirements of this specification as shown on the Drawings and the NEC for bonding and grounding.
- b. Description - Multi-conductor cable, insulated conductor is twisted into pairs.
 - 1) Conductor - Bare copper wire.
 - 2) Stranding - Solid ASTM B-1 for Sizes No. 8 and smaller. Stranded ASTM B8 for Sizes No. 6 and larger.
 - 3) Grounding system conductor from inside equipment to grounding rods or plates and under ductbanks shall be tin-plated rope lay type. Note: This is a special item; order well in advance of installation.
- c. Manufacturers
 - 1) Anixter - Model 1A or 1B.
 - 2) General Cable
 - 3) Allied Wire and Cable
 - 4) Or Equal.

B. Wire Terminations and Connectors

1. General

- a. Connector material shall be compatible with the wire that it is to be used with.
- b. Connectors made of aluminum shall not be used with copper conductors.
- c. Connectors listed below are for use with copper wire. [Connectors to be used with aluminum wire shall be of the same general type and construction as those listed below, but shall be suitable for use with aluminum conductors.]

2. Terminal Block Manufacture

- a. Control Wiring
 - 1) Buchanan - Model 0241.
 - 2) Connectron - Model NSS3.
 - 3) Or Equal.

- b. Equipment Power Wiring
 - 1) Buchanan - Model 416.
 - 2) Connectron - Model NC3.
 - 3) Or Equal
- 3. Two-Way Splices
 - a. Description - Tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.
 - b. Manufacturer
 - 1) Burndy - Model YS-L "Hylink."
 - 2) Thomas & Betts - Model 545.
 - 3) 3M - Model 10000.
- 4. Crimp Connectors
 - a. Description - For branch circuit connections, other than lighting and receptacle circuits.
 - b. Manufacturer
 - 1) Ideal - Series 30; Model 410, 411, 412 with Model 415 and 417 insulator.
 - 2) Thomas & Betts - Model PT66M,
- 5. Bus or Lug Terminals, Manufacturer - 600 VAC, Crimp Type
 - a. Burndy - "HYLUG" Catalog, Series YA.
 - b. Ideal - Catalog Series CCL and CC.
- 6. Terminal Strip Connectors
 - a. Description - For control and instrumentation connections to terminal strips. Locking fork, vinyl, self-insulated, crimp-type connectors or tubular clamp type.
 - b. Manufacturers
 - 1) Burndy - "VINYLUG" Types TP-LF and BA-EL.
 - 2) Thomas & Betts - Catalog Series 18RA, 14RB, and 10RC.
 - 3) Ideal - Series 83-7.
 - 4) Or Equal

7. Wire Nuts

a. For Unclassified Areas - Hexagonal-shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).

- 1) Ideal - Models 341 and 342.
- 2) 3M - Models 212, 312, and 512.
- 3) Buchanan - Models B-1, B-2, and B-4.
- 4) Or Equal

b. For Wet, Corrosive, and Hazardous Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL listed for 600V with temperature rating of 105 degrees C (221 degrees F).

- 1) Ideal - Model DB Plus.
- 2) Buchanan - Model BTS2 and BTS4.
- 3) Or Equal

8. Bolted Wire Connectors - Mechanical connectors for all combination of copper conductors. Connectors shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hex head bolts.

- a. Burndy - Model KVSU.
- b. Ideal.
- c. ILSCO Corp.
- d. Or Equal

2.03. WIRING DEVICES

A. Wall Switches

1. Types, Manufacturers, and Catalog Numbers

CONTACT	P&S	LEVITON	G.E.	HUBBELL
1-pole	20AC-1	1221-2	GE5951-1G	1221

B. Receptacles (Note: All receptacles shall be "side wired" style. "Push-in" styles are not acceptable.)

1. GFCI Receptacle

- a. Pass & Seymour, Inc. - Model 2091-S.
- b. Hubbell - Model GF-5362.

- c. General Electric - Model GFR-5342.
 - d. Leviton - Model 6899.
 - 2. Dust and Moisture-Resistant Receptacle, Gray Face, [Exterior Use]
 - a. Pass & Seymour, Inc. - Model CR6307.
- C. Verify wall openings are neatly cut and will be completely covered by wall plates.
- D. Wall Plates - Install receptacle and switchplates in accordance with the following schedule:
 - 1. Interior, Unclassified
 - a. Unfinished
 - 1) Stainless steel
 - 2. Exterior
 - a. Weatherproof plate with receptacle-in-use cover.
 - b. Weatherproof light switches.

2.04. GROUNDING

- A. See Section 16100.

2.05. ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

- A. Product Requirements
 - 1. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
 - 2. The following materials are not acceptable: spring steel clips, spring steel clamps, powder-actuated anchors, and expansion anchors of any kind.
 - 3. Seismic Considerations - The Massachusetts State Building Code, latest edition (including amendments), shall be in effect. Submit shop drawings for all electrical supports and anchors that include seismic restraint calculations and details as required to meet earthquake design data indicated on structural drawings. Calculations and details, if required, shall be designed and stamped by a Massachusetts registered Professional Engineer retained by the Contractor.
 - 4. Equipment Anchoring and Supports - All equipment shall be securely anchored to the building and properly supported to resist the seismic forces at the site. Anchorage for equipment subject to thermal expansion shall be in accordance with recommendations of the manufacturer. Anchors and fasteners shall be of such size and number to resist the shear and overturning moments from the seismic forces.
 - 5. Contractor shall consider the equipment weight, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (vibration, thermal expansion, etc.) associated with equipment or piping so that the supports are proper for the installation

B. Electrical Channel

1. For Non-classified Areas -Stainless steel, Type 316. Manufacturers: Uni-Strut, B-line
2. For Exterior Locations - Stainless steel, Type 316. Manufacturers: Uni-Strut, B-line

C. Conduit Clamps

1. Two or more conduits run parallel for a distance of more than 5 feet shall be supported from electrical channel by steel conduit straps. Straps shall be PVC coated in all exterior applications.
2. All conduits that do not meet the above criteria shall be supported using cast malleable iron clamp and mating malleable iron clamp backer-spacer (two-piece clamp). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Clamp and spacer shall be PVC coated for all classified and exterior applications. Stamped metal or two-piece PVC clamps are not acceptable.

2.06. NAMEPLATES AND LABELS

A. Nameplates

1. Material - Rigid laminated plastic.
2. Lettering Height - 5/16-inch high.
3. Lettering Color - White.
4. Background Color - Black.

B. Labels

1. Self-debossing, aluminum foil type.
2. Typewritten or preprinted black legends on white background.
3. Permanent Pressure-Sensitive Adhesive - Provide high temperature adhesive for labels on heat producing devices.
4. Use preprinted sleeve type for conductors. Label at each termination or splice.
5. Manufacturers - Seton or equal.

C. Equipment and Control Identification

1. In addition to the requirements of the National Electrical Code, install an identification label which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchgear and motor control assemblies, control devices and other significant equipment.
2. Provide nameplates for all electrical equipment and controls.
3. Attach nameplates with stainless steel or other non-corrosive metallic rivets or screws.

4. Provide a nameplate at each remote switch or control device when the controlled function is not readily identifiable.
5. All wiring except major power conductors shall have each end of the conductor labeled. Label wires at each junction box.

PART 3 EXECUTION

3.01. CONDUIT INSTALLATION

A. Conduit System Fabrication

1. All interior conduit shall be installed exposed. No conduit shall be in or under slabs.
2. No conduits within walls where the walls are below grade, i.e., in basements or galleries.
3. Conduit Defects - All conduit runs, cuts in coatings, to be free of indentations, elliptical sections, blisters, and other defects. Repair or replace damaged conduit sections as instructed by the Engineer.
4. Conduit Cutting - Cut all conduit ends square and remove all burrs. Cut conduit ends exactly to avoid excessive penetration into boxes.
5. Expansion Joints - Provide approved conduit expansion joints wherever conduit crosses a structural expansion joint; is attached between two separate structures; the conduit run is 50 feet or more in a single length for Types D and D-1 conduit or 100 feet or more for Types A; or wherever shown or specified. Support conduit on each side of the expansion joint.
6. Preparation for Conductor Installation - Prior to pulling cables in any conduit system, thoroughly clean the inside of each length of conduit by swabbing or the use of compressed air to remove all foreign matter. Then temporarily plug the ends of each conduit to prevent the entrance of dirt or foreign matter.
7. Couplings
 - a. Tightly butt ends of conduit into the couplings.
 - b. In exposed work only, where standard couplings cannot be used, only union-type couplings are permitted or as otherwise acceptable to the Owner.
8. Cutting of Structures - Keep the cutting of walls or floors for conduit to a minimum. Where such cutting is absolutely necessary, take care so as not to weaken the walls or floor involved. Do not cut beams or other structural supports under any condition.
9. Connection to Devices - Conduit attachment to all electrical equipment, such as sheet steel junction boxes, pullboxes, switches, etc., to be made with approved fittings with non-metallic bushings. Set screw fittings are not acceptable.
10. Conduit Bends and Elbows
 - a. Rigid Metallic Conduit Systems (Type)

- 1) Heating metal conduit to facilitate bending is strictly prohibited.
 - 2) Field bending metal conduit is permitted as follows:
 - a) Type A- Up to and including 3/4-inch size.
 - 3) For all rigid metal conduit larger than that above, use manufactured elbows.
 - 4) Make all bends with radius no less than NEC requirement.
- b. Rigid Non-Metallic Systems (Types D and D-1)
- 1) Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
 - 2) Field bending of Types D and D-1 conduit is permitted only if a "hot box" is used.
 - 3) Make all bends with radius no less than NEC requirement.
 - 4) Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.
11. Routing of Conduits - Keep the number of bends, offsets, and crossovers to a minimum; however, not more than three 90-degree elbows or equivalent bends up to 270 degrees is to be installed in any run between pulling or access fittings.
12. Structural - Make holes around conduit or cables watertight or gas-tight via silicone or acrylic latex masonry sealant upon completion of conduit or cable system.
- B. Conduit Size - Minimum conduit sizes shall be as follows unless specifically shown otherwise:
1. 3/4-inch for exposed locations (includes those areas above drop ceiling of lay-in tiles)
 2. 1-inch for any concealed conduit in walls or within or beneath slabs.
 3. 2-inch for any conduit in ductbanks (unless specifically shown otherwise).
- C. Changes in Conduit Sizes - Made at pull or junction boxes except where specifically shown via a pull fitting.
- D. Conduit and Sleeve Sealing
1. Seal inside of conduit (after installing and testing conductors) where passing through exterior walls or walls containing vapor seals or required to be gastight. Sealing may be accomplished by locating junction or approved sealing fitting at wall and filling with an approved waterproof electrical putty or sealing compound. Seal around all interior conduit passing through floor and wall boxouts.
 2. Where driptight and watertight NEMA 4X and 12 installations are required, use only watertight hubs for top or side entry. Locknuts with gaskets are not acceptable. Conduits entering the top of electrical equipment are to either be sealed or located in

such a manner as to prevent water from entering the equipment through the conduit system. Install conduit for ease of sealing.

3. Provide [sleeves where conduit passes through poured-in-place concrete floors or walls. Core drill all other concrete walls, new or existing. Make sleeves 1-inch minimum, larger than O.D. of conduit.

E. Access Fittings

1. May be used as required to facilitate installation of conductors or where shown.
2. Provide access fittings or conductors, as manufacturer recommends so as not to damage conductor or insulation during conductor pulling operations.

F. Pull and Junction Boxes - All pull and junction boxes shall be installed where shown or specified. Additional boxes may be installed as required to facilitate installation of conduit system. See also paragraph 2.01.E.2.

3.02. CONDUCTOR INSTALLATION

A. Installation

1. Install products in accordance with manufacturers' instructions.
2. Do not pull thermoplastic wire at temperatures below 35 degrees F.
3. Protect exposed cable from damage.
4. Neatly train and lace wiring inside boxes, equipment, and panelboards.
5. Install electrical circuit loadings as designed on Contract Drawings unless approved otherwise by Engineer.
6. Wiring Diagrams
 - a. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate and are for bidding purposes only.
 - b. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.
 - c. Install all work in accordance with certified wiring diagrams.
7. Electrical Trade to provide all power, control, and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams

B. Color Coding

1. Provide color coding for all service, feeder, branch, control, and signaling circuit conductors.
2. Grounded Conductor Color Coding in New Installations

- a. Ground – Green.
- b. Neutrals – White for 120V systems; gray for 277V systems.*

*Exception - Where neutrals of more than one system are installed in the same raceway or box, each neutral shall be white or gray with a different colored (not green) stripe.

- 3. In addition to existing facilities, ungrounded conductors in different voltage systems shall match the existing system and/or be as follows:

- a. 120/208-volt, 3 phase: Phase A - Black
120/240* Phase B - Red
Phase C - Blue
- b. 277/480-volt, 3 phase: Phase A - Brown
Phase B - Orange
Phase C - Yellow
- c. 120/208 -volt, single phase: Red and black
- d. DC Power - Positive Lead - Red.
- Negative Lead - Black.
- e. DC Control - All blue.
- f. 120-volt Control Wiring - Single conductor AC control wire shall be red, except a wire entering a motor control center compartment or control panel which is an interlock shall be color coded yellow.
- g. 24-volt Control Wiring - Orange.
- h. Neutral (Grounded Conductor) - White or gray.
- i. Grounding Conductor - Green.

C. Conductor Sizing

- 1. Conductor sizes that are shown for equipment branch circuits are the minimum sizes allowed. Refer to schedule in paragraph 3.02.C.2.c. below for sizing conductors on circuits longer than the minimum length shown for the various voltages. Adjust conduit sizes accordingly.
- 2. Wiring shown without size to be sized by one of the following methods, whichever is larger. No additional payment will be made for oversized conduit or conductor.
 - a. Power and Lighting Circuits - Minimum size No. 12AWG. Quantity as required for proper operation. Use 3/4-inch conduit types as required for the area where conduit is installed.
 - b. Control Circuits - Minimum size No. AWG. Quantity as required for proper operation, use 3/4-inch conduit, type as required for the area where conduit is installed.

- c. Increase minimum size conductors for 20 ampere single phase circuits where distance between power source and item served exceeds noted length in accordance with the following table. No more than 2 percent voltage drop of all branch circuits at equipment's rated full load current is permitted.

120 volts	100' to 150'	#10	151' to 225'	#8	226' up	#6
208/240 volts	100' to 175'	#10	175' to 250'	#8	251' up	#6
265/277 volts	125' to 200'	#10	201' to 300'	#8	301' up	#6
460/480 volts	225' to 350'	#10	351' to 525'	#8	526' up	#6

- d. Minimum size of branch circuits over 20 amps per requirements of NEC Tables 310.16 thru 310.31.

3. Neutral Wire - To be equal to ungrounded wires unless otherwise shown [or where connecting computers; neutral at least one size larger than ungrounded wires.]
4. Ground Wire - Minimum size as required by the NEC Table 250-122.

- D. Spare Conductors - Wherever groups of control and instrumentation conductors are required, provide the following minimum numbers of spare conductors. As required, Contractor shall increase conduit sizes shown to accommodate spare conductors. Terminate at terminal strips on both ends and mark as spare and indicate the location of opposite end.

Conductors	Spares
Up to 10	2
11 to 17	4
19 and over	6

3.03. CONDUCTOR STRANDING

- A. All conductors shall be stranded except for interior lighting and receptacle circuits #10 and smaller.

3.04. CONNECTORS AND TERMINATIONS

- A. Use manufacturer's standard lugs for connection of conductors to equipment panel or devices.
- B. Use UL approved [wire nuts] for lighting and receptacle circuits and for other circuits, compression connectors for connection of conductors to other conductors.
- C. Terminal Board Terminations - All interconnecting instrumentation wiring to terminal boards and strips to be made with insulated crimp type connectors (locking fork type). Stranded wire is not to be directly connected to terminals without the use of connectors unless the terminations are specifically made to accept bare stranded wire, i.e., tubular clamp type termination. No loose strands shall be permitted outside of the connector, whichever is utilized.
- D. Splicing - Make splices in accessible locations and in junction boxes. No splices will be permitted in pulling fittings or MCC wiring spaces.

3.05. ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

A. General

1. Do not drill or cut structural members.
2. Obtain the Engineer's written approval of any drilling or cutting on the structure.
3. Welding as a means of support is prohibited.
4. Provide materials, sizes, and types of anchors, fasteners, and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products and designing system supports.
5. All fasteners shall be stainless steel.

B. Support of Boxes, Control Panels, Starters, Disconnects, and Other Similar Enclosures

1. Support boxes independent of raceway using fittings designed for the application.
2. The use of tie wires, section of conduit, section of pipe, scrap metal, etc., as supporting means is strictly prohibited.
3. Enclosures not called to be mounted on plywood or aluminum panels or stands to be supported by 1/2-inch stainless steel electrical channel.

C. Support of Raceways

1. General - Perform a thorough review of all shop drawings related to work. Determine how equipment, raceway, etc., are to be supported, mounted, or suspended, while providing:
 - a. Extra bolts, inserts, pipe stands, brackets, or any other items required for proper support.
 - b. Supporting accessories where required, whether or not shown on the Drawings.
2. Support all raceways only with approved fittings. Do not hang supporting devices from any but structural members without approval of the Engineer. Deflection of any conduit shall not exceed 1/100th of span. Support all riser conduit at each floor. Rows shall not be used.
 - a. Secure individual runs of conduit with one-hole, two-piece, PVC-coated malleable iron clamps. Stamped steel conduit straps or PVC clamps are not acceptable. Where a single conduit is hung from above, use stainless steel hanger rods and electrical channel.
 - b. Secure multiple runs of conduit to stainless steel electrical channel with steel supports.
 - c. Raceway supports shall be spaced at intervals to meet NEC requirements. Provide supports at all bends and pull fittings.

3. Use grouted anchor on masonry for loads of 100 lbs. or more. For loads less than 100 lbs., drilled inserts may be used. Use precast inserts on poured-in-place concrete. Use lag screws or through bolts on wood.
4. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel.
5. Provide standoffs for all conduit; mount conduit 1/4-inch off walls.
6. The use of wire is prohibited.
7. Provide rods, channels, angles or other structural shape to suspend conduit away from building structures.

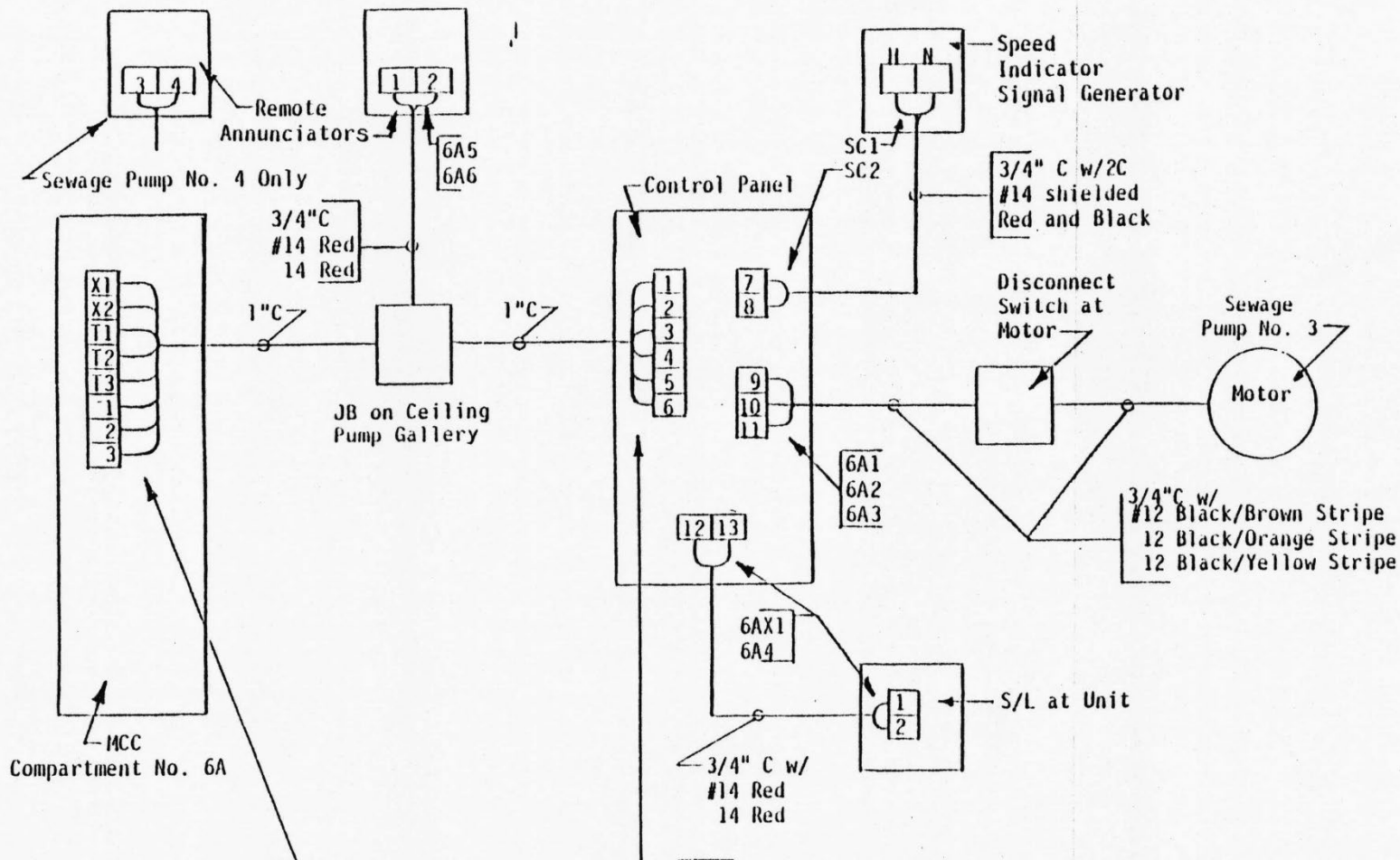
3.06. EQUIPMENT TESTING (600 VOLTS AND BELOW)

- A. See Section 16950, Testing and Inspection.

3.07. EQUIPMENT AND DEVICE MOUNTING HEIGHTS

- A. Mounting heights are as follows, unless otherwise noted:
 1. Receptacles - 48 inches.
 2. Switches - 45 inches to the center.
 3. Control Panels - See Section 16161, Control Panels and Enclosures.

(continued)



SAMPLE
BLOCK DIAGRAM LAYOUT

6AX1	#14 Red
6AX2	#14 Red
6A1	#12 Black/Brown Stripe
6A2	#12 Black/Orange Stripe
6A3	#12 Black/Yellow Stripe
6A4	#14 Red
6A5	#14 Red
6A6	#14 Red

6AX1	#14 Red
6AX2	#14 Red
6A1	#12 Black/Brown Stripe
6A2	#12 Black/Orange Stripe
6A3	#12 Black/Yellow Stripe
6A4	#14 Red

Sewage Pump No. 3
(Pump No. 4 the same except MCC Compartment and associated wire labeling changes to 5B-)

END OF SECTION

SECTION 16100

GROUNDING

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Grounding

1. Items to be grounded include all new or modified work of this Contract, but not be limited to equipment housings, metal raceways, grounding terminals of outlets, outdoor lighting fixtures, ductbanks, and pullboxes, In addition to the National Electrical Code (NEC) requirements and the above, the following, where a part of this project, shall be permanently and effectively grounded:
 - a. All structural metals.
 - b. All metallic panels and conduit.
 - c. Metallic handrailing and walkways.
2. Take special precautions to ground all equipment in strict accordance with the NEC and as otherwise noted in these specifications.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
Section 16055 - ELECTRICAL WORK
- B. Section 16950 - TESTING AND INSPECTION

1.03. REFERENCES

- A. All materials and installations shall be in accordance with the latest revisions of the following:
 1. National Electric Code
 2. Underwriters Laboratories, Inc.

1.04. SUBMITTALS

- A. Shop drawing shall be submitted for only the electrode system and conductors used in connection with the grounding system.
- B. Submit an 18-inch sample of the ground system tin-plated conductor and other samples as may be requested by the Engineer.
- C. Certified test reports of grounding system resistance per Section 16950, Testing and Inspection.

PART 2 MATERIALS

2.01. ELECTRODES

- A. Ground Rods - 3/4-inch diameter x 10 feet long (minimum) steel core copper jacketed. Rods shall be manufactured by Copperweld Steel Company, Thompson Lightning Protection, Inc., or equal.
- B. Ground Plates - 1/4-inch x 24-inch x 24-inch square copper plates.

2.02. CONDUCTOR

- A. Ground Conductor (Above Grade) - Type XHHW insulated wire in conduit or other raceway. Color code insulation per NEC.
- B. Ground System Conductor (Buried) - Soft drawn or soft annealed stranded copper, tinned bare stranded conductor. Note: This type conductor is not always readily available, and long lead times should be anticipated. For conductors run from inside of building to grounding system conductor, also, use tinned bare stranded copper.
- C. Equipment Bonding Conductor - For sizes 8 AWG and smaller, solid ASTM B-1. For sizes 6 AWG and larger, stranded ASTM B-8, bare copper.

2.03. CONNECTORS

- A. Compression-Type Fittings
 - 1. Construction - Two bolts and a minimum of 1-1/2 inches in length.
 - 2. Manufacturers
 - a. Thomas & Betts
 - b. Burndy Corporation
 - c. ILSCO.
 - d. Or Equal
- B. Welded Connection
 - 1. Construction - Molded fusion-welding process.
 - 2. Manufacturers
 - a. Cadweld
 - b. Thermoweld
 - c. ILSCO.
 - d. Or Equal

C. Mechanical Connection

1. Construction - Mechanical lugs securely fastened using silicon bronze hardware.
2. Manufacturers
 - a. Thomas & Betts
 - b. Burndy Corporation
 - c. Or Equal

PART 3 EXECUTION

3.01. GROUND SYSTEM DESCRIPTION

- A. Install ground system or grid as shown on the Contract Drawings. Install such that tops of driven ground rods are a minimum of 12 inches below grade. Ground rods are to be driven at least 2 feet below the groundwater level. Depth of the conductor system is to be 30 inches minimum with a minimum length of .20 feet. Thermoweld rods to copper, rope-lay grounding conductor or use approved mechanical connections to rods where grounding conductor is No. 4 or smaller.
- B. When rods are shown and cannot be driven due to boulders or rock formations, this specification will allow NEC 250.53G guidelines for the angled ground rods, but not the horizontal rod, and where shown, to install grounding plates below groundwater level or a minimum of 6 feet below grade.
- C. Final resistance to ground of completed ground system shall be a maximum of 5 ohms in accordance with Section 16055, Electrical Work and Section 16950, Testing and Inspection. If tests indicate higher than 5 ohms resistance, then the Contractor shall install additional rods or plates at no additional cost to Owner to lower the resistance to below 5 ohms.

3.02. CONNECTIONS

- A. Buried Connection - Made with either thermal welded or compression fittings for buried pipe/plate bonding or specially made for grounding systems
- B. Exposed Connection - Made with grounding system compression-type fittings.
- C. Connection to Metal - Make all connections to water pipes, steel surfaces, etc., using mechanical connectors.
- D. Thoroughly clean all surfaces to bright bare metal to accept ground connections.

3.03. GROUNDING ELECTRODE CONDUCTOR

- A. Size per NEC 250-66 unless larger size is shown or specified below:
- B. Services
 1. Up to 200 amps - #4 cu.

3.04. MAIN SERVICE GROUNDS

- A. Bond ground system securely to:
1. Connect grounding electrode conductor building water service. (If available and if metallic water pipe is used and is of sufficient conductive length to ensure continuity, provide jumpers around meters or other removable devices as required.) See Contract Drawing for conductor size and pipe location.
 2. Building structural steel (if available), including canopy, roof and hoist supports. One No. 6 minimum two places, opposite.
 3. One No. 6 to foundation (footing) steel reinforcing (20-foot minimum length 1/2-inch rebar).
 4. Connect two grounding electrode conductors in conduit to facility grounding grid or system.

3.05. BUILDING GROUND CONNECTION

- A. Connection from main ground to building system shall be as specified herein and as required. Positively connect equipment housings and conduit system to main service ground, only at main service ground.

3.06. INDIVIDUAL GROUNDS

- A. If individual equipment or individual building grounds are made, separate grounding conductors (in earth where possible) shall connect these grounds to main service ground. (This requirement applies only within each system of subsystem fed from a distribution transformer.) Intent is that main ground shall be at the main or incoming power source and not at utilization point unless positively connected to same.

3.07. INTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Electrical integrity of conduit system shall be maintained throughout. Provide bonding jumpers at fittings as required; jumpers shall be no longer than required. Provide separate ground wire for all conduit systems.

3.08. EXTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Provide separate ground wire for all conduit systems leaving the building interior. Size per NEC 250-122 or as shown.
- B. Exterior grounding systems to be installed in Schedule 80 PVC conduit.

3.09. FEEDERS

- A. Include an insulated grounding conductor, sized per NEC 250-66, in each conduit sized for total feeder cross-sectional area. Bond all served equipment frames, enclosures, ground bars, etc., to this conductor. Make all conductor terminations and connections using compression lugs or fittings designed and UL labeled for the purposes.

3.10. SEPARATE GROUND

- A. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and connect neutral to ground at the main service grounding point only. Run separate insulated (green) grounding conductors from all grounding points independently back to main service ground. Where ground passes through panels and disconnects, ground lugs shall be brazed or bolted to panel or disconnect housings with neutral bus or lug isolated from same. Ground all metallic conduits at each panel. Clean paint from metal to accept ground lugs.

3.11. METALLIC, NON-CURRENT CARRYING ENCLOSURE

- A. Connect to ground bar at load center supplying same through conduit system using proper fittings at junction boxes, expansion joints, and between ground bushings on each conduit within all sheetmetal enclosures.

3.12. CONDUIT SEALS

- A. Where non-metallic conduits protecting grounding conductors enter the building from the exterior, provide watertight wall seals on each conduit and a sealing bushing on the enclosed conductor. Sealing bushings on all conduits penetrating the floor. Make bonding jumper connection to metallic conduit, where equipped with sealing bushings, with water pipe ground connections of proper size. Seal watertight the inside of all conduits entering the building below grade.

3.13. GROUND CONDUIT LABELS

- A. Label all service, equipment frame, or motor grounding conduits containing only grounding conductors " _____ ground." Label to identify item being grounded.

3.14. PACKAGED ENGINE GENERATOR SYSTEM

- A. Ground and neutral of the generator through a service entrance-type ground link at the generator transfer switch, in accordance with the NEC.
- B. Connect generator equipment frame to ground system at two points via No. 6 ground conductors. Install in 1-inch conduit where conductor is in or under support slab.

3.15. DUCTBANK GROUND CONDUCTOR

- A. Install a new ground rod and bond the ductbank ground conductor to it.

3.16. METAL STAIRS AND GUARDRAILS (HANDRAILING)

- A. Provide a No. 6 ground conductor to each stair.
- B. Provide a No. 6 bonding jumper between sections of guardrails including stair guardrails.

3.17. EXTERIOR LIGHT POLES

- A. Provide a No. 6 ground conductor from ground rod to light pole and a No. 6 bonding jumper to conduits.

END OF SECTION

SECTION 16161

CONTROL PANELS AND ENCLOSURES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks.
- D. Control stations.
- E. Accessories.

1.02. RELATED SECTIONS

- A. Section 01010 – SUMMARY OF WORK
- B. Section 01300 – SUBMITTALS
- C. Section 16055 - ELECTRICAL WORK
- D. Section 16475 - OVERCURRENT PROTECTIVE DEVICES

1.03. REFERENCES

NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 4	Terminal Blocks for Industrial Control Equipment and Systems
ANSI/NFPA 70	National Electrical Code
UL	Underwriters Laboratories, Inc.

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01300 and 16055.
- B. Submit shop drawings for all control panels. The submitted information shall be detailed specification information proving compliance to these specifications. Submittals shall include, but not be limited to, the following:
 - 1. Enclosure information including size and NEMA classification.
 - 2. Subpanel layout.
 - 3. Wiring diagrams and elementaries.
 - 4. Bill of materials.
 - 5. Internal components (specification information, cut sheets).
 - 6. List of nameplate titles.

7. Dimensions.

- C. Shop drawings shall be submitted for all materials used as enclosures.
- D. Submit equipment and material samples as requested by the Engineer.
- E. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.06. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05. DEFINITIONS

- A. Power Wiring - Shall mean conductors, conduit, wireway and connections, and related electrical work to supply electrical power to equipment, including electrical power to supply point for equipment control systems.
- B. Control Wiring - Shall mean conductors, conduit, wireway, construction and related work to connect or interconnect relays, solenoids, contact devices, signal lights and audible signals, as well as any and all other electrical control devices indicated as related to the control functions.
- C. Control Panel (CP) - Is an enclosure used to house logic or power devices such as CPT, starters, contactors, relays, timers, and may also contain pilot devices.
- D. Control Station (CS) - Is an enclosure used to house pilot devices only, such as pushbuttons, indicating lights, and selector switches.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

1.07. EXTRA MATERIALS

- A. Provide two of each cabinet key.
- B. Provide one box of each size and type of control circuit fuses.
- C. Provide three of each size and type of 3 phase power fuse.
- D. Provide one of each size and type of single phase power fuse.

PART 2 PRODUCTS

2.01. MANUFACTURERS - NEMA 4X STAINLESS STEEL

- A. Hoffman - Model Series SSLP.
- B. Saginaw Control & Engineering.
- C. Rittal.

D. Or equal.

2.02. MANUFACTURERS - NEMA 12 STAINLESS STEEL SINGLE DOOR

A. Hoffman - Model Series LP.

B. Saginaw Control & Engineering.

C. Rittal.

D. Or equal.

2.03. ACCESSORIES

A. Provide cable ties.

B. Manufacturer - Terminal Blocks

1. Buchanan - Model 0241.

2. Connectron - Model N553.

3. Or equal.

C. Manufacturer - Wire Duct.

1. Stahlin Brothers - Model XT-Panel Channel.

2. Panduit Corporation - Model Type E-Dark Grey.

3. Or equal.

D. Manufacturer - Grounding Terminals

1. Burndy - Model OA4C-AB.

2. Or equal.

E. Provide one drawing pocket in the panel, minimum size 10 inches wide by 10 inches high by 1/2 inch deep, panel manufacturer's standard material and finish.

F. Power Disconnect Switch - Built in to flange of enclosure with door interlock. Through-the-door types will not be acceptable.

PART 3 EXECUTION

3.01. POWER CIRCUIT PROTECTIVE DEVICES

A. Shall be in accordance with Section 16475, Overcurrent Protective Devices.

3.02. NAMEPLATES

A. Provide nameplates on the exterior of each enclosure identifying the application or function of the enclosed equipment.

3.03. EQUIPMENT HOUSING TYPES

- A. Enclosure, Control Panel or Device Applications – When no type is shown or specified, provide stainless steel.
 - 1. Exterior Locations - NEMA 4X.
 - 2. Interior Wet Locations - NEMA 4X.
 - 3. Corrosive Areas - NEMA 4X.
 - 4. Hazardous Areas - NEMA 7.
 - 5. All Other Areas - NEMA 12.

3.04. CONTROL PANEL CONNECTIONS

- A. Regardless of who furnishes or installs the various panels, all are connected electrically by the electrical trade unless specifically shown or specified otherwise.

3.05. FINISH REPAIR

- A. Repair damage to the factory finish. Depending on the extent of damage to the factory-finish and/or the closeness of the color match of any field-applied paint, a complete repainting may be ordered by the Owner at his discretion.

3.06. DOOR QUANTITY

- A. Provide two doors if panel is larger than 36 inches wide.

3.07. CONTROLS AND ASSOCIATED CIRCUITRY

- A. Each control panel shall contain all applicable disconnects, including a single main power disconnect (unless specifically shown otherwise on the Drawings); motor circuit disconnect - one for each motor; necessary control pushbuttons; timers; relays; door interlock switches; indicator lights; selector switches; alarms; instruments and associated circuitry to monitor and control the associated equipment. Main power disconnect operating mechanisms shall be flange mounted not through the door.

3.08. CONTROL PANEL WIRING

- A. Wire Type - See Section 16055, Electrical Work.
- B. Wire Duct - Used for wiring between devices that are mounted on the back panel of control panels.
- C. Wire Bundling - Where it is not possible to run wire in wire duct, such as wire run from devices located in the back of a panel to devices mounted on the door of a panel, the wire is to be bundled. Wire lacing or twine is not acceptable.

Bundles are to be wrapped by a spiral plastic protective sheath. Secure bundles to the panel structure for a stable support with a spacing of no less than every 8 inches.

A wire bundle which must cross a hinge shall run along the hinge as far as possible or have a large loop in bundle and be secured at both ends so that the twisting is taken over the longest length of hinge possible. Wire shall not be split off from the bundle along this length.

- D. Wiring and Termination Methods - Interior wiring to be point-to-point with no splices. All wiring from and to the control panel to be through terminals located in the panel. Solderless insulated crimp-type locking fork lugs shall be used for terminations to screw-type terminals. Where screw-type terminals are not used, terminals shall be of the tubular clamp type. Install lugs such that no uninsulated wire is visible at the wire entry point, and wire strands are visible but not protruding from the screw connections end. Use solderless connectors or tubular clamp connectors for all connections to terminals and equipment.
- E. Shielded Wire - Separate from other wires and equipment with suitable barriers and with terminal blocks for continuous shield grounding to the connecting cables.
- F. Separate intrinsically safe wiring from all other wiring with barriers.
- G. Furnish panels factory-wired and tested with all equipment and appurtenances mounted thereon.
- H. Wire Labeling - Mark wires at both ends with numbers from Engineer-approved elementaries per Section 16055, Electrical Work. Color coding per Section 16055.
- I. Panel Wiring - All panel wiring shall be installed by the panel manufacturer.
- J. Lamp Test Switch – For panels with more than five indicating lights. Provide a single lamp test switch in lieu of push-to-test type indicating light.

3.09. TERMINAL BLOCKS

- A. Arrange terminals in alphabetic and numeric order in columns on removable subplates. Locate columns at least 4 inches from any edge of the subplate and space 6-inch on centers and at least 2 inches from a wiring duct.
- B. Provide marked terminals with wire number from Engineer-approved elementaries. Locate terminals with the same wire number adjacent to each other and jumpered.
- C. Make a maximum of two connections to each side of a terminal, including jumpers.
- D. Provide an additional 20 percent spare terminals with the following as minimum requirements:
 - 1. Power Terminals - Two spares.
 - 2. Control Terminals - Ten spares.
- E. At least one position on a terminal block must be reserved for termination of each incoming wire. Locate all such positions on the same side of the column of terminals. A wiring duct to feed the terminals must be sized to include wires for these positions.
- F. Connect all ground terminals of power receptacles solidly to the frame of the panel. Provide the panel with one grounding terminal in the control panel. Mount grounding terminals to the frame of the panel or rack.

3.10. WIRING DUCT

- A. Size wiring duct at 60 percent fill according to the maximum number of wires at any cross section, including field wiring terminations and spares. Wiring duct must be plastic.

3.11. CONTROL PANEL INSTALLATION

- A. Wall-mount panel enclosures that are up to 48 inches in height; floor-mount larger panel enclosures.
- B. Furnish control panels, where shown, with power disconnect switches which will de-energize the power supply to the panel.
- C. Ground Panels - Connect all equipment and circuits in the panels shown or required to be grounded to the grounding conductors.
- D. Install panels where shown. Provide conduit entry as shown or specified.
- E. Upon completion of installation, the equipment manufacturer's representative shall check panels and make necessary adjustments.
- F. Panel manufacturer to mount all equipment shown or specified to be furnished with a panel. Furnish panels as completely assembled units.
- G. For all wall-mounted panels, provide a minimum of four brackets designed for wall mounting.

3.12. MOUNTING HEIGHT

Mount control panels such that:

- A. No disconnect handle is higher than 6 feet 6 inches to the highest part of handle. Mount all separately enclosed circuit breaker, disconnect switch handles 4 feet 6 inches from floor or other working surface unless otherwise indicated (5 feet to the top of enclosure).
- B. Top of wall-mounted enclosures shall not be higher than 6 feet.
- C. No pilot device is higher than 5 feet 6 inches.
- D. No operator interface device (i.e., graphic display screen, etc.) is higher than 5 feet 0 inches to the centerline of the device.

3.13. ENCLOSURE INSTALLATION METHODS

- A. Support - Adequately support all enclosures from walls, structure, or on support panels or plates independently of the conduit system. Provide additional supports for seismic restraint.
- B. Support Material - Size fasteners utilizing a safety factor of 5.
- C. Special Mounting Accessories - Provide stainless steel screws and bolts for mounting in exterior, interior wet, hazardous, corrosive locations or elsewhere when exposed. This includes cover screws and bolts and mounting accessories.
- D. All panels and enclosures shall be installed level and plumb.

END OF SECTION

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Circuit breakers below 600 volts.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01400 - QUALITY CONTROL
- C. Section 01600 - MATERIALS AND EQUIPMENT
- D. Section 01700 - RECORD DOCUMENTS
- E. Section 16055 – ELECTRICAL WORK
- F. Section 16161 - CONTROL PANELS AND ENCLOSURES

1.03. REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation"
- B. NEMA AB-1 - Molded Case Circuit Breakers
- C. NFPA 70 - National Electrical Code

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals and Section 16055.
- B. Product Data - Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.
- C. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- D. Samples as requested by the Engineer.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Circuit Breakers - Conform to requirements of NEMA AB-1 and UL 489.
- C. Furnish products listed and classified by UL or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Circuit Breakers
 - 1. Square D
 - 2. Cutler-Hammer
 - 3. General Electric
 - 4. Or Equal

2.02. GENERAL REQUIREMENTS

- A. Circuit breakers shall be of the molded case type.
- B. Shall consist of the number of poles, ampere rating and interrupting rating as shown or specified.
- C. Molded case circuit breakers shall have overcenter toggle-type mechanism, providing quick-make, quick-break action. Mechanism shall be mechanically trip-free from the handle so the contacts cannot be held closed against short circuit currents.
- D. Multiple pole breakers shall be common trip type.
- E. On and Off positions shall be clearly marked and color coded.
- F. All breakers in panels for switching duty shall be "SWD" or "T" rated, for switching duty.
- G. Breakers over 100 ampere frame size shall have front adjustable magnetic trip elements to provide instantaneous tripping over a range of 400 percent to 1000 percent of the continuous ampere trip rating.
- H. Service Conditions
 - 1. Temperature - 105 degrees F (40 degrees C).
 - 2. Altitude - 50 feet (15 M).
- I. All breakers shall be of the bolt-on type.
- J. Dimensions and Performance - NEMA FU-1; class as specified or indicated.
- K. Voltage - Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

2.03. CONTACTS

- A. Contacts shall be non-welding under rated operating conditions.
- B. Silver-to-silver type.
- C. Provide with suitable arc interrupting devices.

2.04. TERMINATIONS

- A. Circuit breakers shall have lugs that accommodate wire sizes shown on the Contract Drawings, including additional lugs where shown or required.
- B. Lugs shall be UL listed for copper conductors only.
- C. Breakers shall be UL listed for mechanical-type lugs

2.05. RATINGS

- A. All circuit breakers shall meet or exceed the following unless otherwise noted on the Contract Drawings or specifications.

FRAME SIZE MAXIMUM CONSTANT CURRENT- AMPS	NEMA* INTERRUPTING CAP. SYMMETRICAL - AMPS	POLES	MAXIMUM VOLTAGE RATING
100	10,000 @ 120 volts	1	120
100	10,000 @ 240 volts	2,3	240
100	18,000 @ 480/277 volts	1	480
100	18,000	2,3	600

*Interrupt ratings are at 480 volts unless noted otherwise.

2.06. BREAKER TRIP CHARACTERISTICS

All breakers shall be Type A thermal magnetic type unless noted otherwise on the Contract Drawings or specified.

- A. Thermal Magnetic Type (Type A)
 - 1. Long time, nonadjustable, thermal overload, trip.
 - 2. Instantaneous, electromagnetic trip.
 - 3. Ambient compensating.
 - 4. "Push-to-trip" test button.
- B. Integral Magnetic and Solid-State Trip Type (Type B)
 - 1. Provide solid-state logic programmer.
 - 2. Long delay, range adjustable trip.
 - 3. Magnetic pick-up, range and time adjustable, trip.
 - 4. Integral power supply.
 - 5. 100 percent equipment rated.
 - 6. Integral ground fault protection where noted on the Contract Drawings or specified.
 - 7. Ground fault system neutral current transformer for each breaker equipped for ground fault.

8. "Push-to-trip" pushbutton.
9. Adjustable rating plug type.

PART 3 EXECUTION

3.01. GENERAL

- A. Circuit breaker trip ratings and fuse sizings shown on the Contract Drawings are maximum for the specific application.
- B. Breakers shall be removable from the front of the panel or board without disturbing adjacent units.
- C. All breakers shall be suitably mounted in an enclosure in accordance with Section 16161, Control Panels and Enclosures. Individual-mounted circuit breakers and fused switches shall be provided with NEMA enclosures and installed at locations shown on Drawings and as required by NEC at approximately 60 inches from floor to top of enclosure.

3.02. HANDLE OPERATORS

- A. All enclosures for individually-mounted circuit breakers or fuses shall have enclosure-mounted handle operators, operating through approximately 180-degree arc. Flush mounted circular rotating handle operators are unacceptable.

3.03. IDENTIFICATION

- A. Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, and other information as defined in UL 489 in accordance with Section 16055, Electrical Work.

3.04. TERMINALS

- A. All terminals shall comply with UL 486A and B and CSA 1165 Standards. Torque markings shall be provided and followed per UL 489.
- B. Terminals shall be amply sized, including adapters or special lugs to connect the conductor(s) as shown, specified or required.

3.05. RATINGS - FUSES

- A. Main distribution fuses shall be sized as shown on the Contract Drawings.
- B. Motor and device fuses shall be sized as per the manufacturer's requirements in accordance with the NEC.

3.06. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400, Quality Control and Section 16055, Electrical Work.
- B. Inspect and test each circuit breaker 70 amperes and larger to NETA ATS-1995.
- C. Inspect each circuit breaker visually, per NETA ATS-1995.

- D. Perform several mechanical On/Off operations on each circuit breaker.
- E. Verify circuit continuity on each pole in closed position.
- F. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB-1 requirements.
- G. Include description of testing and results in test report.

3.07. ADJUSTING

- A. Adjust work under provisions of Section 01700, Record Documents and Section 16055, Electrical Work.
- B. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.
- C. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION

SECTION 16497

AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.01. SUMMARY

- A. Automatic transfer switches (ATS) with delayed transition with number of poles, amperage, voltage, withstand and close on ratings as shown on the drawings and specified. Automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer. Project includes replacement/upgrade of emergency power systems at two separate locations. See contract drawings.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01400 - QUALITY CONTROL
- C. Section 01600 - MATERIAL AND EQUIPMENT
- D. Section 01700 - RECORD DOCUMENTS
- E. Section 16055 - ELECTRICAL-WORK
- F. Section 16161 - CONTROL PANELS AND ENCLOSURES
- G. Section 16620 - PACKAGED ENGINE GENERATOR SYSTEMS

1.03. REFERENCES

- A. NFPA 70 - National Electrical Code
- B. NEMA ICS 1 - General Standards for Industrial Control and Systems
- C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems
- E. UL 1008 - Standard for Transfer Switch Equipment
- F. NFPA 110 - Emergency and Standby Power Systems

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals and Section 16055, Electrical Work.
- B. Shop drawings shall be submitted for all materials furnished under this section.
- C. Furnish the shop drawing for the automatic transfer switch as part of the submittal for Section 16620 Packaged Engine Generator Systems.

- D. The shop drawing shall include, as a minimum, the following equipment specification information. The information shall be highlighted and prove compliance with these specifications.
 - 1. Electrical Ratings - Voltage, switch ampere rating, and short circuit ratings.
 - 2. Protective devices and ratings.
 - 3. Layout drawings.
 - 4. Performance functions.

- E. Manufacturer's Instruction - The Contractor shall furnish three copies of a composite instruction book covering this equipment. Each instruction book shall not necessarily be limited to, but shall include as a minimum, the following:
 - 1. Instructions covering overall equipment.
 - 2. Instructions covering all major and serviceable components.
 - 3. Instructions covering all accessories.
 - 4. Recommended spare parts with current prices, applicable to paragraphs 1, 2, and 3.
 - 5. Complete renewal parts information.
 - 6. Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.07. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05. OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700, Record Documents.
- B. Operation Data - Include instructions for operating equipment. Include instructions for operating equipment under emergency conditions when engine generator is running.
- C. Maintenance Data - Include routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.06. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum ten years' documented experience, and with service facilities within 100 miles of project.
- B. Supplier – Authorized distributor of specified manufacturer with minimum ten years' documented experience.

1.07. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

- C. American National Standards Institute (ANSI).
- D. American Society for Testing and Materials (ASTM).
- E. National Electrical Manufacturer's Association (NEMA), latest version.
 - 1. ICS 1 - General Standards for Industrial Control and Systems
 - 2. ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies
 - 3. ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems
 - 4. ICS 6 - Enclosures for Industrial Controls and Systems

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600, Materials and Equipment. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.09. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.10. MAINTENANCE SERVICE

- A. Furnish service and maintenance of transfer switch for one year from date of Substantial Completion.

1.11. MAINTENANCE MATERIALS

- A. Provide two of each special tool required for maintenance.

1.12. WARRANTY

- A. Provide manufacturer's five-year warranty.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Transfer switches shall be manufactured by the same manufacturer of the generator unit. Or,
- B. Russ Electric
- C. ASCO

2.02. AUTOMATIC TRANSFER SWITCH

- A. Description - NEMA ICS 10, automatic transfer switch.

- B. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted.
- C. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- D. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.
- E. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.
- F. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.
- G. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
- H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.03. TERMINATION AND LUGS

- A. Provide lug sizes and quantity per phase, at minimum, to accommodate the size and number of conductors shown as terminating at the ATS normal, emergency, and load side connections on the Drawings.
- B. Note transfer switch located on the generator platform shall have lugs to accommodate two separate sets of conductors which feed two separate fused disconnect switches.

2.04. SERVICE CONDITIONS

- A. Service Conditions - NEMA ICS 1.
- B. Temperature - 15 degrees F to 105 degrees F).
- C. Altitude 50 feet (15 m).

2.05. RATINGS

- A. Voltage - 480 volts, three phase, four wire, 60 Hertz.
- B. Switched Poles - Three
- C. Continuous Amperage Rating - As stated on the Contract Drawings.
- D. Interrupting Capacity - 65 kA

- E. Withstand and Closing Rating - The ATS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans.

2.06. PRODUCT OPTIONS AND FEATURES

- A. Indicating Light Emitting Diode (LED) Lights - Mount in cover of enclosure, one to indicate when the ATS is connected to normal source (green), one to indicate when the ATS is connected to emergency source (red), one to indicate when the normal source is available (green) and one to indicate when the emergency source is available (red). This ATS shall have a light indicating Load Disconnect Active.
- B. Test Switch - Mount in cover of enclosure to simulate failure of normal source
- C. Return to Normal Switch - Mount in cover of enclosure to initiate manual transfer from alternate to normal source, to bypass time delay.
- D. Transfer Switch Auxiliary Contacts - Contacts rated 10 amps, 240 VAC shall be provided consisting of one contact, closed when the ATS is connected to normal source and one contact closed, when the ATS is connected to emergency source.
- E. Normal Source Monitor - The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100 percent and dropout adjustable from 75 to 98 percent of pickup setting.
- F. Alternate Source Monitor - Single-phase voltage sensing of the emergency source shall be provided, with a pickup voltage adjustable from 85 to 100 percent and frequency sensing with pickup adjustable from 90 to 100 percent.
- G. In-phase monitor.

2.07. AUTOMATIC SEQUENCE OF OPERATION

- A. Initiate Time Delay to Start Alternate Source Engine Generator - Upon initiation by normal source monitor.
- B. Time Delay To Start Alternate Source Engine Generator - 0 to 6 seconds, adjustable.
- C. Initiate Transfer Load to Alternate Source - Upon initiation by normal source monitor and permission by alternate source monitor.
- D. Time Delay Before Transfer to Alternate Power Source - 0 to 5 minutes adjustable.
- E. Initiate Retransfer Load to Normal Source - Upon permission by normal source monitor.
- F. Time Delay Before Transfer to Normal Power - 0 to 30 minutes, adjustable; bypass time delay in event of alternate source failure.
- G. Time Delay Before Engine Shut Down - 0 to 60 minutes, adjustable, of unloaded operation.
- H. Repetitive accuracy of all settings shall be +2 percent or better over an operating temperature range of -20 to 70 degrees C. Voltage and frequency settings shall be fully field adjustable in 1 percent increments over the whole range without the use of tools, meters or power supplies.

- I. A visual position indicator shall be provided to indicate bypass-isolation switch position. Pilot lights shall indicate availability of power sources. A prominent and detailed instruction plate shall be furnished.
- J. Delayed Transition back to Utility Time Delay - 0 to 5 minutes. Initially set to 15 seconds.

2.08. ENCLOSURE

- A. Enclosure - NEMA Type 4X, stainless steel.
- B. Instruction Nameplate and LEDs - The switch assembly shall be provided with a detailed instruction nameplate permanently fastened to the front of the unit. The following LED lights shall be available on the front of the unit:
 - 1. Normal Source Available.
 - 2. Emergency Source Available.
 - 3. Automatic Transfer Switch in Test Position.
 - 4. Automatic Transfer Switch Isolated.
 - 5. Automatic Transfer Switch Inhibit.
 - 6. Automatic Transfer Switch Operator Disconnect Switch Off.
 - 7. Automatic Transfer Switch in Normal Position.
 - 8. Automatic Transfer Switch in Emergency Position

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surface is suitable for transfer switch installation.

3.02. INSTALLATION

- A. Install transfer switches in accordance with manufacturer's instructions.
- B. Provide engraved plastic nameplates under the provisions of Section 16055, Electrical Work.
- C. Mounting Height - Per Section 16161, Control Panels and Enclosures.

3.03. DEMONSTRATION

- A. Demonstrate operation of transfer switch in bypass, normal and emergency modes. Provide startup/commissioning services in conjunction with startup/commissioning of the generator specified in Section 16620, Packaged Engine Generator Systems.

3.04. TESTS AND CERTIFICATION

- A. The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards,

and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

- B. The manufacturer shall be certified to the ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001.

3.05. SERVICE REPRESENTATION

- A. The ATS manufacturer shall maintain a local service center within a 100-mile radius of the job location. The service center's personnel must be factory trained and must be on call 24 hours per day, 365 days per year.
- B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

SECTION 16620

PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Packaged diesel engine generator set. Project includes replacement/upgrade of emergency power systems at two separate locations. See contract drawings.
- B. Exhaust silencer, catalyst and fittings.
- C. Battery(ies), charger and heater(s).
- D. Fuel piping and fittings.
- E. Weatherproof/sound-reducing enclosure.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 01400 - QUALITY CONTROL
- D. Section 01600 - MATERIAL AND EQUIPMENT
- E. Section 01700 - RECORD DOCUMENTS
- F. Section 16055 - ELECTRICAL WORK
- G. Section 16161 - CONTROL PANELS AND ENCLOSURES
- H. Section 16497 – AUTOMATIC TRANSFER SWITCHES

1.03. REFERENCES

- A. NEMA AB1 - Molded Case Circuit Breakers
- B. NEMA MG1- Motors and Generators
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- D. NFPA 30 - Flammable and Combustible Liquids Code
- E. NFPA 70 - National Electrical Code
- F. NFPA 101 - Life Safety Code
- G. NFPA 110 - Emergency and Standby Power Systems

1.04. SCOPE OF WORK

- A. Provide standby power generator and automatic transfer switch (ATS) (as specified under Section 16497, Automatic Transfer Switch) as a complete packaged system. Generator shall be provided with an enclosure, fuel tank, battery and battery charger, silencer, load center, and other accessories as specified in this section. Generator is to be installed on a platform such that final generator location is above the existing floodplain elevation. Coordinate with the General Contractor and platform fabricator. Provide accurate generator assembly drawings and information (including dimensions, wet weight, contact points) as requested by the General Contractor and platform fabricator. Coordinate to determine final platform elevation and provide for generator off-loading accordingly. .
- B. Provide Installation, start-up/commissioning, and training services as specified herein.

1.05. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 16055, Electrical Work. All equipment provided under this section will be supplied by the generator supplier, who shall be responsible for the overall operation of all components supplied regardless of manufacturer
- B. Shop Drawings - Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams. These include but are not limited to weights of all major components.
- C. Product Data - Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, and generator enclosure.
- D. Performance Test Reports - Indicate results of factory performance testing for the actual unit to be supplied. Submit prior to the unit being shipped.

Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Manufacturer's Field Reports - Submit typewritten reports under provisions of Section 01400. Quality Control. Reports shall indicate procedures and findings. Submit after field testing.
- F. Installation shall be in full compliance with the Massachusetts Department of Environmental Protection (MDEP) Environmental Results Program. Refer to Emergency Engine and Emergency Turbine Environmental Certification Workbook. Contractor shall fill out and submit all relevant Installation Compliance Certification documentation, Contractor shall submit this with the shop drawings, as well as submitting it to MDEP. Shop drawing submittal shall include stack height modeling analysis.

1.06. OPERATION AND MAINTENANCE DATA

- A. Contractor shall submit operation and maintenance data in both hard copy and electronic formats. Submit under provisions of Section 01700, Record Documents. Contractor shall provide manufacturer/supplier with a copy of Section 01700, Record Documents. These shall include, but not be limited to, the generator installation; normal operation, control and parts

manuals. Interconnection diagrams for generator, control panel, battery charger, and all other powered ancillary devices.

- B. Maintenance Data - Include instructions for routine maintenance requirements, service manuals for engine, oil sampling and analysis for engine wear, and emergency maintenance procedures.
- C. Operation and maintenance data shall be submitted at the time the generator is shipped.

1.07. QUALITY ASSURANCE

- A. To provide proven reliability of the generator set, three series of tests shall be performed, with no exceptions taken:
 - 1. Prototype model tests per UL 2200 standards shall be submitted with shop drawing.
 - 2. Fully assembled factory production model tests.
 - 3. Field acceptance tests with certified strip chart, two hours at varying loads. Submit to Engineer when the unit is shipped.
- B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results for the submitted generator. Generator sets that have not been prototype tested and factory production tested as described herein shall not be acceptable.
- C. Generator Set Prototype Tests - These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submitted for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.
- D. Torsiograph Analysis and Tests- The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses.
- E. Alternator Temperature Rise Test - Data to match specified temperature output. No position measured any place in the windings may exceed the temperature rise limits of NEMA MG-1 for Class H insulation.
- F. Short Circuit Test - A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. At the conclusion of this test, the generator set must be capable of full load operation.
- G. Endurance Run Test - The generator set shall be subjected to an endurance test operating at variable load up to the standby rating to verify structural soundness and durability of the design.
- H. Maximum Power Test - The generator set shall be guaranteed to meet or exceed the specified rating with the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place.
- I. Cooling System Test - The generator set shall be guaranteed to meet or exceed the specified rating with the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place.

- J. Maximum Motor Starting KVA Test - The generator shall be tested to simulate motor starting by applying the specified KVA load at low lagging power factor.
- K. Transient Response, Steady-State Speed Control, and Voltage Regulation Test - Prototype generator set tests shall demonstrate consistent performance within the specified maximum limits.
1. Voltage Regulation - +0.5 percent.
 2. Random Voltage Variation - +0.5 percent.
 3. Frequency Regulation - +0.25 percent.
 4. Random Frequency Variation - +0.25 percent
- L. Generator Set (Genset) Factory Production Tests - On the equipment to be shipped, a two-hour test shall be performed at varying loads and at 0.8 P.F. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing.
1. Factory Test - The unit shall be completely assembled and all preliminary adjustments made before the test is initiated. Genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator heat exchanger attachments shall not be acceptable.
 2. The above testing shall be recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:
 - a. Intake air pressure.
 - b. RPM.
 - c. Output voltage per phase.
 - d. Output amperes per phase.
 - e. Power factor.
 - f. KW
 3. The above testing shall be recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.
- M. Field Acceptance Tests - Generator supplier shall provide and conduct a four-hour loadbank test at unity power factor for the generator set. Contractor must provide portable loadbank (including all cables and terminations) for testing generator set at 100 percent load. Loadbank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the Engineer for final acceptance. No handwritten field notes will be allowed. See Part 3 for required additional testing.
1. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment, whose

primary role is start-up, commissioning and service (i.e. not a sales representative). Contractor is responsible for providing testing equipment and any additional cable, etc., required.

- N. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every 15 minutes.
- O. Transient Response Testing Sequence
 - 1. 0-25 percent, 25 percent-0.
 - 2. 0-50 percent, 50 percent-0.
 - 3. 0-75 percent, 75 percent-00
 - 4. 0-100 percent, 100 percent-0.

1.08. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the Products specified in this section with minimum ten years' documented experience; local manufacturer's representative within 100 miles of project; with factory trained service personnel, technical assistance, and stock of replacement parts, and Supplier – Authorized distributor of specified manufacturer with minimum ten years' documented experience.

1.09. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.
- B. Furnish products listed and classified by Underwriters Laboratories or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- C. Contractor or his manufacturer/supplier shall provide written certification that the generator set being provided meet these requirements.
- D. Generator shall be in compliance with local, state and federal regulations and shall be in accordance with the requirements of the MassDEP Installation Compliance Certification for New Emergency Engines & Emergency Turbines and MassDEP Emergency Engine and Emergency Turbine Environmental Certification Workbook as well as air pollution standards.
- E. Sound reduction shall meet state and local noise codes.
- F. Generator shall meet requirements of TR-16.

1.10. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600, Materials and Equipment and Section 16055, Electrical Work.
- B. Accept unit on site on skids. Inspect for damage.
- C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

- D. Contractor is responsible for off-loading and setting the equipment included in this section. Contractor shall engage the services of a qualified rigging firm / crane.

1.11. MAINTENANCE SERVICE

- A. Furnish service and maintenance of engine generator for two years from Date of startup at no additional cost to the Owner. Service will require yearly lubricating oil changes, including fuel and air cleaners (filters). Supplier shall provide lube oil testing, coolant testing, and fuel testing at each one-year anniversary of Substantial Completion. Provide a written report with findings and recommendations.

1.12. PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing fieldwork of this section.

1.13. WARRANTY

- A. Warranty - The manufacturer of either the engine or the generator shall warrant the complete standby power system specified herein to be free from defects in materials and workmanship, whether functional or non-functional, and shall replace or repair without cost to the Owner any defects which, with normal usage, appear or otherwise manifest themselves within five years or 1,500 operating hours of service, commencing from the date of Substantial Completion. Coverage shall include parts, labor, travel expenses, and labor to remove/reinstall any parts of equipment. There shall be no deductibles applied to this warranty.

1.14. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01700, Record Documents.

1.15. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700, Record Documents.
- B. For each engine-generator, provide two of each fuel, oil and air filter element under provisions of Section 01700, Record Documents. These are not for use by the Contractor during the two-year service/maintenance period.

1.16. GENERATOR FUELING

- A. Owner to initially fill the fuel tank. Fuel for testing and temporary operations will be the responsibility of the Contractor. Contractor shall refill tank after all testing is completed, at no additional cost to Owner.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Kohler- Model 40REOZK (design basis)
- B. Cummins- Model C50 D6
- C. Caterpillar - Model D50-2IC

D. MTU Onsite Energy - Series 0113D

E. Or Equal.

2.02. PACKAGE ENGINE GENERATOR SYSTEM

A. Description - NFPA 110, engine generator system to provide source of power for Level 1 applications, and conforming to NFPA 99. Engine shall meet the current tier requirements for emission control at the time the generator is shipped.

B. System Capacities -

1. Nominal KW (KVA) - 42 (52.5).
2. Alternator Rating - Minimum 212 KVA (motor starting at 90 percent sustained voltage). This may require an oversized alternator.
3. Alternator Temperature - 130 degrees C.
4. Nominal Voltage - 277/480.

2.03. ENGINE

A. Type – Water-cooled inline or V type, four-cycle, compression ignition diesel internal combustion engine.

B. Fuel System - No. 2 fuel oil, maximum sulfur content of 0.3 percent.

C. Engine speed - 1800rpm.

D. Governor - Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.

E. Safety Devices - Engine shutdown on high water temperature, low oil pressure, overspeed, low coolant level, and engine overcrank. Limits as selected by manufacturer.

F. Engine Starting - DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with Manual Off Remote selector switch on engine generator control panel.

G. Radiator - Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 122 degrees F (50 degrees C). Radiator air flow restriction 0.5 inches of water (1.25 Pa) maximum.

H. Engine Accessories - Fuel filter, lube oil filter, fuel solenoid valve, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, water pump. Include fuel pressure gauge, water temperature gauge, and lube oil pressure gauge on engine/generator control panel.

I. Mounting - Provide unit with suitable vibration isolators to meet International Building Code (IBC).

2.04. ALTERNATOR

- A. Generator - NEMA MG1, three phase, four pole, re-connectible brushless synchronous generator with brushless PMG exciter.
- B. Rating 480Y/277 volts, 60Hz at 1800rpm, with the following minimum ratings:
 - 1. kW- 42 (site rated maximum kW at 130 degrees C)
 - 2. KVA- 52.5 (at 0.8 power factor and 130 degrees C)
 - 3. Maximum Volt Dip - 15 percent (starting and running the full and stepped loads as noted herein). An oversized alternator may be required to be provided.
- C. Temperature Rise - 130 degrees C.
- D. Enclosure - NEMA MG1, unit, mounted, non-walk-in, sound attenuated.
- E. Voltage Regulation - Include generator mounted volts per Hertz exciter regulator to match engine and generator characteristics, with voltage regulation +1 percent from no load to full load. Include manual controls to adjust voltage droop, voltage level (± 5 percent) and voltage gain.
- F. AC waveform total harmonic distortion less than 5 percent no load to full linear load, less than 3 percent for any single harmonic.

2.05. ACCESSORIES

- A. Exhaust Silencer - Residential type silencer, with muffler companion flanges, wall/roof thimble as required vertical stack with counterbalanced flapper or horizontal stack with stainless steel bird screen, flexible sections or wye, tailpipe, rain cap, flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions, and condensate drain with plug type drain valve in accordance with manufacturer's recommendations.
 - 1. Contractor shall provide complete exhaust piping system per manufacturer's recommendations. Exhaust pipe shall be minimum 1,000 degrees F black iron Schedule 80 with welded or flanged joints. Size as recommended by manufacturer.
 - 2. Vibration insulators shall be provided between the enclosure and the exhaust silencer supports as required by the manufacturer. They shall be sized to prevent any vibrating stress on the enclosure.
 - 3. Exhaust system shall be in accordance with tier emissions standards, applicable at the time the generator is shipped.
- B. Batteries - Heavy duty, diesel starting type lead acid storage batteries, sized per manufacturer's recommendations with amp-hour and cold cranking amp rating per manufacturer's recommendations for the genset to be provided. Match battery voltage to starting system. Include necessary cables and clamps.
- C. Battery Box - Provide non-metallic electrolyte resistance box, constructed to contain spillage. A "marine"- type battery box will be acceptable
- D. Battery Charger - Current limiting type with four-stage charging cycle. Stages are trickle, bulk, absorption, and float. Charger shall fully charge battery within 24 hours. Mount within enclosure and include the following features:

1. Output Voltage Reduction - +1 percent.
 2. Output - 12 amps for 24-volt dc system, isolated from AC line.
 3. Float Voltage - Adjustable.
 4. Equalize Charge Time - 0 to 12 hours.
 5. DC Voltmeter - Via display.
 6. DC Ammeter - Via display.
 7. Protection - DC output breaker and resettable input breaker.
 8. Temperature Sensor - Adjust charging rate based on interval battery temperature in absorption and float stages
 9. Charger shall be mounted inside the generator sound-proof enclosure.
- E. Line Circuit Breaker - NEMA AB 1, 80 percent rated molded case circuit breaker on generator sized in accordance with NFPA 70. Provide with a current limiter and AC power entrance box.
- F. Engine Generator Control Panel - NEMA 250, Type 1 generator mounted panel enclosure with engine and generator controls and indicators. Together with 120V single phase anti-condensation heater. Control panel shall be mounted so that centerline is 5 feet above the working surface. Include provision for locking and the following equipment and features:
1. Control Functions - The control system provided shall include a cycle cranking system which allows for user-selected crank time, rest time, and number of cycles. Initial settings shall be for three cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
 2. The control system shall include an idle mode control which allows the engine to run in idle mode in the run position only. In this mode, the alternator excitation system shall be disabled.
 3. The control system shall include an engine governor control which functions to provide steady-state frequency regulation as noted elsewhere in this specification.
 4. The control system shall include time delay start (adjustable 0 to 300 seconds) and time delay stop (adjustable 0 to 600 seconds) functions.
 5. The control shall have automatic remote start capability from a panel-mounted three-position switch (Stop, Run, Remote). Provide cycle cranking of 15 seconds (On), 15 seconds (Off) for three attempts (75 seconds). If engine fails to start, lock out the engine and indicate overcrank on alarm status panel.
 6. The control shall shut down and lock out upon failing to start (overcrank), overspeed, low lubricating oil pressure, high engine temperature, or operation of a remote manual stop station. A panel-mounted switch shall reset the engine monitor and test all the lamps.
 7. Ground fault indicator.
 8. Digital metering with bar graph display for 3 phase:

- a. AC volts.
 - b. Amperes.
 - c. kW.
 - d. Power factor.
 - e. Frequency.
9. Output voltage adjustment.
 10. Engine Run/Off/Auto selector switch. Provide remote start capability.
 11. Engine running time meter.
 12. Alternator temperature monitoring and indication.
 13. Oil pressure indication.
 14. Water temperature indication.
 15. Voltage adjustment control to allow +5 percent voltage adjustment.
 16. Auxiliary Relay - 3 PDT, operates when engine runs, with contact terminals prewired to terminal strip.
 17. Additional audible, visual indicators and alarms as required by NFPA 110. Level 2 use.
 18. Remote Alarm Contacts - Pre wire SPDT contacts to terminal strip for remote alarm functions required by NFPA 110 and as specified.
- G. Remote status and Alarm Contacts as illustrated on the Contract Drawings - Alarms are to be sent to the remote annunciator, all wired to terminal strips for remote indication. Provide interposing relays where required.
- H. Seismic Vibration Isolators - Mount generator on isolators. At least four such isolators shall be utilized and be sized per manufacturer's requirements within their proper working range for the unit supplied. Seismic certified to comply with IBC latest edition.
- I. Outdoor Weather-Protective, Non-Walk-In, Unit-Mounted, Sound-Attenuated Enclosure
1. The generator set shall be provided with a factory supplied weather-protective, non-walk-in, unit-mounted, sound-attenuated enclosure. The package shall comply with the requirements of the National Electrical Code for all wiring materials, working clearances and component spacing. The total assembly of generator set and enclosure shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 122 degrees F. The housing shall have sound-attenuating capability to limit the sound pressure level to a maximum of 64 dB(A) at a distance of 23 feet. The housing shall have stainless steel hinged access doors (36-inch width) located to maintain easy access for all operating and service functions. The doors shall be lockable and include retainers to hold the doors open during service; all hardware shall be stainless steel. Enclosure roof shall be cambered to prevent rainwater

accumulation. All enclosure penetrations shall be sealed or otherwise protected to keep snow and rain from entering enclosure. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure or unit-mounted control panel.

2. Enclosure shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electrocoating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
 - a. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
 - b. Gloss, per ASTM D523-89, 80 percent +5 percent. Gloss retention after one year shall exceed 50 percent.
 - c. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
 - d. Impact resistance, per ASTM D2794-93, 160 inch-pounds.
 - e. Salt spray, per ASTM B117-90, 1,000+ hours.
 - f. Humidity, per ASTM D2247-92, 1,000+ hours.
 - g. Water soak, per ASTM D2247-92, 1,000+ hours.
3. Fasteners used shall be stainless steel and designed to minimize marring of the painted surface when removed for normal installation or service work.
4. Enclosure shall be constructed of minimum 12 gauge steel for framework and 14 gauge steel for panels. Fiberglass enclosures shall not be acceptable. All hardware and hinges shall be stainless steel.
5. A factory-mounted residential exhaust silencer shall be installed either inside or outside the enclosure. The exhaust shall terminate above the roof. Exhaust connections to the generator set shall be through seamless flexible connections.
6. The enclosure shall include the following maintenance provisions.
 - a. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the generator frame, with internal drain valves
 - b. Internal radiator fill provision.
7. Motorized louvers shall include provisions to prevent accumulation of ice or snow that might prevent operation.
8. Inlet ducts shall include rain hoods.
9. Provide a GFCI 20A weatherproof-in-use receptacle on the outside of the enclosure (48 inches high).
10. Factory-wired engine coolant, alternator and lube-oil heaters, genset control panel, fuel pump(s) and battery charger (cold connected) to a factory mounted common junction box.

11. The enclosure shall be insulated with non-hygroscopic materials.
12. The enclosure shall be suitable for mounting on a generator with a subbase fuel tank.
- J. Subbase Fuel Tank - Minimum of 229-gallon (usable) subbase fuel tank unit with rupture basin (with leak detection alarm) and with single integral pump and level control. Include flexible fuel line connections, fuel gauge, high fuel level (set to 90 percent of fill capacity) and low fuel level alarm contacts, and indicating lights.
- K. Tank shall be sized to permit 48 hours of operation at full load. Provide double wall steel tank with fill vent, leak detector, high level alarm set at 90 percent, overfill prevention valve, overfill monitoring, lockable 2-inch fill cap, stainless steel spill pan with minimum 5-gallon capacity, fuel level gauge, venting to UL 142 in both primary and secondary containments, UL listed, and meet all local and regional Code requirements for aboveground fuel tanks.
- L. Provide dry contacts for tank low level, high level, and overflow level.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Contractor shall coordinate with the Owner and the Contractor's subcontractors and employ all reasonable means necessary to cause minimal disruption to the Owner's operations during installation.

3.02. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400, Quality Control. Manufacturer's representative shall visit site to assist the Contractor with the installation and to make a final site inspection at least two weeks prior to the loadbank test. Contractor shall make any modifications or adjustments recommended by the manufacturer's representative. A copy of the typewritten site inspection report shall be provided to the Engineer prior to functional load testing.
- B. Provide full load (100 percent of genset rating) NFPA110 functional test utilizing portable loadbank for four hours minimum for each generator. Actual hours on site shall be a minimum of eight. Times to set up, complete test, tear down, and clean up after tests are also included. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal. Load may be stepped onto gen set in up to a maximum of four equal steps. Generator shall also be loaded in one step. Output voltage dips shall not exceed 15 percent at any load step, including the one step full load testing shall include a "cold start" pickup of loads (one shot), full load test, and shutdown/cooldown.
- C. Record in 15-minute intervals during four hour test:
 1. Kilowatts.
 2. Amperes.
 3. Voltage.
 4. Frequency.

5. Coolant temperature.
 6. Ambient temperature.
 7. Oil pressure.
- D. Test all alarm and shutdown circuits by simulating conditions.
 - E. Testing shall be coordinated with and approved by the Owner prior to test date and shall be performed in such a manner as to cause minimal disruption to plant operations.

3.03. MANUFACTURER'S FIELD SERVICES

- A. For each generator, provide the service of a manufacturer's service technician for a minimum of two hours for each unit to inspect the installations and a minimum of eight hours for each generator system and transfer switch to start up and perform load testing (final acceptance). Technician shall be factory trained and certified by the manufacturer to perform startup, testing, troubleshooting, service, and maintenance of engine generator systems of the type and size (rating) specified herein. Technician shall be regularly engaged in this type of work as their primary job function. The technician shall arrive on site with his own tools, spare parts, and a copy of the field inspection report specified in paragraph 3.02.A. Prior to the scheduling of testing, the Contractor shall submit, for approval by the Engineer, the technician's name and qualifications/certification data, along with the name, address, and telephone number of the office or division from which they are dispatched. All fuel for testing shall be paid for by the Contractor. Owner will fill the tank before and after testing; the difference will be paid for by the Contractor at the second fill-up cost per gallon.
- B. Prepare and start systems under provisions of Section 01400, Quality Control.
- C. Submit three copies of a final typed report covering all observations, site conditions, test values, and instructions given to the Owner.
- D. Provide manufacturer's complete instruction manual per Section 01700, Record Documents. Also, provide electronic copies of available and applicable operation and maintenance materials.
- E. For each generator system, provide up to two hours of on-site training by manufacturer's service technician at the time of the load test. A second two-hour on-site training session per system shall be provided during the first year of the five-year warranty period. Owner will arrange through Contractor. Initial training session shall be videotaped by the Contractor and two digital copies given to the Owner. If the tape or the training presentation is not of the quality necessary for the Owner's continued use as determined by the Owner, the training session shall be redone within two weeks of notification. The second videotaping does not qualify as the required second session. All costs of the retraining and taping are the responsibility of the Contractor.
- F. All times are the minimum hours required and are actual on-site times including labor and equipment. All other labor, travel, and subsistence expenses are the responsibility of the Contractor.
- G. Manufacturer/supplier shall provide operational assistance to the Owner, as the Owner requires, during the first year of the warranty period.

3.04. ADJUSTING

- A. Adjust work under provisions of Section 01700, Record Documents.
- B. Adjust generator output voltage and engine speed.
- C. Prepare and submit a typewritten tabulation of all adjustable settings, including factory default settings.
- D. Tighten all connections if any leakage is detected.

3.05. CLEANING

- A. After testing, clean work area under provisions of 01700, Record Documents.
- B. Clean engine and generator surfaces. Replace oil and fuel filters after load test. Contractor to properly dispose (off site) of used filters in accordance with applicable regulatory requirements. Replacement filters shall be in addition to the required spares.

3.06. DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 01700, Record Documents. Describe loads connected to emergency system and restrictions for future load additions.
- B. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide emergency power.

END OF SECTION

SECTION 16950
TESTING AND INSPECTION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Electrical power distribution and control circuit testing.

1.02. RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK
- B. Section 01300 - SUBMITTALS
- C. Section 01700 - RECORD DOCUMENTS
- D. Section 16055 - ELECTRICAL WORK

1.03. SUBMITTALS

- A. Submitted in accordance with Section 01300, Submittals, and Section 16055 - Electrical Work.
- B. Submit test records and reports for all testing.

1.04. CERTIFICATION OF TESTING

- A. Perform all tests in the presence of a duly authorized representative of the Owner unless waived in writing by the Engineer. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the Contractor.
- B. Perform all tests in the presence of the Engineer or Owner's representative. Give the Engineer/Owner written notice of all tests at least two weeks in advance.

1.05. TEST EQUIPMENT

- A. Furnish all instruments and a qualified engineer to properly perform all tests required.

1.06. FACTORY TRAINED SUPERVISION

- A. Provide necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation as may be required by these specifications. This shall include establishing a simulated fault on checking out the coordination of the protective devices.
- B. Make necessary adjustments and testing in cooperation with the respective manufacturers and other Contractors when necessary. Perform all tests in accordance with the latest standards of the ANSI, IPCEA, IEEE and NEMA.

1.07. COSTS

- A. Costs of all tests shall be borne by the Contractor and shall be included in the contract price.

1.08. DAMAGES

- A. If damage is indicated or observed during testing or from the review of tabulated data, replace defective or damaged materials and retest at no cost to the Owner.

PART 2 MATERIALS

2.01. TESTING EQUIPMENT

- A. Furnish all test equipment required to correctly perform the system tests.

2.02. SPECIAL EQUIPMENT REQUIREMENTS

- A. 500 volt dc Megger - For maximum 300-volt systems, use a hand crank only.
- B. 1,000-volt dc Megger - For maximum 600-volt systems, use a hand crank only.

PART 3 EXECUTION

3.01. GENERAL

- A. After completion of the work, thoroughly test the entire electrical system, including electrical work required for instrumentation, control and power, and adjust electrical system as required.
- B. Test all electrical circuits to insure circuit continuity, insulation resistance, proper splicing, and freedom from improper grounds.
- C. System performance test runs are required. Coordinate test runs of electrical systems with test runs of equipment served thereby (i.e., mechanical, heating, air conditioning, process systems and plumbing).

3.02. GENERAL TESTING METHODS

- A. Panels - Test each panel with mains disconnected from the feeder, branches connected, branch circuit breakers closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed.
- B. Feeders - Test with the feeders disconnected from the panels.
- C. Individual Power Circuits - Test each individual power circuit at the panel with the power equipment connected for proper operation.
- D. Lighting and receptacle circuits do not need to be megger tested.

3.03. EQUIPMENT TESTING (600 VOLTS AND BELOW)

- A. Megohmmeter Tests
 - 1. Conduct megohmmeter tests of the insulation resistance of rotating machines and power distribution feeders down to panelboard feeders. The results will be accepted when the megger shows the insulation resistance to be not less than 50 megohms at

20 degrees C using either a 500 volt or 1,000 volt megger. Wait 1 minute between each test for all conductors in the same enclosure and each conductor and ground.

2. Perform megohmmeter testing (Insulation Resistance Test) of all motor power and control wiring after the cables are in place and just prior to final terminations. Record all data as per Exhibit A. Lighting and receptacle panelboard branch circuits are not megohmmeter tested.
- B. Voltage and Amperage Testing
1. Check the load current in each phase of each distribution, lighting and receptacle panelboard feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for each panelboard.

3.04. GROUNDING SYSTEM

- A. Test the grounding system to verify a resistance to ground of 5 ohms or less. If the resistance is greater than 5 ohms, modifications shall be made to the system by adding additional ground rods or plates to bring the resistance test value to 5 ohms or less. Perform test a minimum of 90 days after the installation of the ground rods. Submit a record/report to the Engineer. Include the following:
1. Time, date, temperature, frost information depth (if applicable), and weather conditions.
 2. Location of ground grid under test.
 3. Date of ground grid installation.
 4. Driven depth of electrodes.
 5. Moisture content of earth at time of measurement (wet, dry, etc.).
 6. Ground test equipment, model numbers, and last date of calibration.
 7. Detailed description of method used.
 8. Plot of "distance from ground grid versus resistance." Resistances shall range from 0 to 50 ohms with enough points to produce a smooth curve.
 9. Maintenance information and recommendations (if applicable).
- B. Test all grounding conductors and grounding systems for continuity. Where continuity does not exist, conditions will be corrected by an approved method and the system retested.

3.05. SYSTEM LOAD BALANCING

- A. Check the load current in each phase of each distribution panel feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for distribution panels.

3.06. CLOSEOUT PROCEDURES

- A. General - Sequence closeout procedures so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated. Closeout shall be in accordance with Section 01700, Record Documents, and as required herein.
- B. Final Operational Check - Make a check of each item in each system to determine that it is set for proper operation. With the Engineer or Owner's representative present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During the following test runs, make final corrections or adjustments of systems to refine and improve performances where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices to permit observation of actual system performances and shall demonstrate that controls and items requiring service or maintenance are accessible.
- C. Cleaning and Lubrication - After final performance test run of each electrical system, clean system both externally and internally, comply with manufacturer's instructions for lubrication of both power and hand operated equipment, and remove excess lubrication, touch up minor damage to factory painted finishes and other painting specified as electrical work, and refinish work where damage is extensive.
- D. Operating Instructions - General operating instructions are required. In addition to specific training of the Owner's operating personnel specified in the individual sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified elsewhere in these specifications, provide general operating instructions for each operational system and equipment item of electrical work, and coordinate instructions with instructions for mechanical work, and other equipment where associated with electrical systems or equipment.
- E. System Description and Operation
 - 1. Perform in the presence of the Owner, the Owner's operating personnel and the Engineer.
 - 2. Describe each basic electrical system and explain identification system, displayed diagrams, signals, alarms and audio visual provisions.
 - 3. Describe interfaces with mechanical equipment, including interlocks, sequencing, startup, shutdown, emergency, safety, system failure, security, and similar provisions.
 - 4. In the presence of the Owner's personnel, display and conduct a "thumb through" explanation of maintenance manuals, record drawings, spare parts inventory, storage and extra materials, meter readings, and similar service items.

3.07. CONTINUED SYSTEM OPERATIONS SUPPORT

- A. Coordinate the Owner's takeover of electrical systems with takeover of mechanical systems, including the provision of skilled electrical operating and maintenance personnel until the time the Owner's personnel take over operation of entire mechanical and electrical plant. Respond promptly with continued consultation and services (beyond takeover date) on electrical systems, matching required continued services on associated mechanical systems and equipment until the end of the warranty period.

3.08. DOCUMENTATION PROCEDURE

- A. Signed commitments are required. The transfer of electrical systems to the Owner for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by Contractor and other entities have been executed and transmitted to and accepted by the Engineer for placement in the Owner's records.

3.09. THERMOGRAPH INSPECTIONS

- A. Perform thermograph inspections on all service terminations, major power splices, automatic transfer switch, and generator terminations. Testing on major power distribution equipment will be performed with the pump station running at a minimum of 70 percent capacity or the highest load that can be operated. Testing on individual pieces of equipment will be performed while the unit is operational at rated load and has operated for at least 30 minutes for continuously operated equipment or near the end of a cycle for equipment that operates on/off. Loads shall be minimum of 40 percent of full load. Readings at overcurrent devices will be for line and load. Provide a report of test results to the Owner including indication of any actions taken to resolve abnormal readings. See Exhibit B at the end of this section. All thermographic tests shall be reported on this form.

(continued)

EXHIBIT A

**TESTING AND INSPECTION
ELECTRICAL INSULATION TEST RECORD
INSULATION RESISTANCE TEST**

EQUIP. I.D. CKT/MARK NO.	TEST VOLTAGE	PHASE TO GND. MEG OHMS				PHASE TO PHASE MEG OHMS						DATE TESTED
		A	B	C	N	A-B	A-N	B-C	B-N	C-A	C-N	

TEST EQUIPMENT CONTROL NO. _____

REMARKS: _____

PERFORMED BY: _____ DATE _____

APPROVED BY: _____ DATE: _____

Test Engineer

EXHIBIT B
TESTING AND INSPECTION
THERMOGRAPHIC TERMINATION TEST

EQUIPMENT	AMBIENT ⁽¹⁾	LINE/PRIMARY			LOAD/SECONDARY			LOAD CONDITION (% OF FULL)	COMMENTS ^(2,3)
		1	2	3	1	2	3		

Thermograph Model _____

Date of Test _____ Conducted by _____

Outdoor Temperature _____ Room Temperature _____

Owner/Engineer Witness _____

(1) Ambient is the breaker case temperature, transformer winding temperature, or motor housing temperature. For bus or cabling, it shall be the temperature of the bus or cable a minimum of 24 inches from the splice or termination.

(2)

TEMPERATURE DIFFERENCE	CONDITION	ACTION
1°C to 3°C	Possible deficiency	Investigate, i.e., clean terminations/retorque
4°C to 15°C	Deficiency	Determine problem and repair; retest
16°C and above	Major deficiency	Immediate shutdown; determine problem and repair and retest

(3) Indicate any discrepancies the cause of any temperature differences and indicate action to be taken.

Test Parameters:

- Imaging equipment shall be capable of detecting a minimum temperature difference of 1 degree at 30 degrees C.
- Equipment shall detect and convert emitted radiation to a visual signal.
- Tests to be run during periods of maximum possible loading, but at least 40 percent of rated load.

END OF SECTION