
**Project Manual
for
Equalization Basin No. 3 and 4
Water Pollution Control Facility**


Wareham, Massachusetts

**Volume I of I
Contract No. 2020-001**



1545 Iyannough Road - Route 132
Hyannis, Massachusetts

2020

Marc Drainville

July 13, 2020

**PROJECT MANUAL
FOR
EQUALIZATION BASIN NO. 3 AND 4
WATER POLLUTION CONTROL FACILITY**

**TOWN OF WAREHAM, MASSACHUSETTS
CONTRACT NO. 2020-001**

VOLUME I OF I

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

2020

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INVITATION TO BID
EQUALIZATION BASIN NO. 3 AND 4
WATER POLLUTION CONTROL FACILITY
TOWN OF WAREHAM, MASSACHUSETTS
CONTRACT NO. 2020-001

Sealed Bids for General Contractors for the construction of the Equalization Basin No. 3 and 4 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 Wednesday, August 5th, 2020 and at that place and time will be publicly opened and read aloud.

The Work consists of installation of two (2) new lined equalization basins in accordance with the Bidding Documents heretofore prepared by GHD Inc. 270 calendar days will be allowed for contractor to achieve substantial completion and 30 calendar days to achieve final completion.

The Town of Wareham is the Issuing Office for this Project. Contract documents will be available July 15 at 2:00 pm. The Contract Documents may be examined at the following locations:

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

The electronic documents can be obtained online 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:

EQUALIZATION BASIN NO. 3 AND 4
WATER POLLUTION CONTROL FACILITY

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.

Bidding and award of this Contract shall be required to comply with Massachusetts General Law Chapter 30 Section 39M, and all other applicable Massachusetts General Laws.

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.

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.

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 non-mandatory Pre Bid Conference will be held outdoors at 10:00 a.m. on Wednesday, July 22 at 10:00 am at the Wareham Water Pollution Control 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: July 14, 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 shall be distributed electronically 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, within 10 days of Owner's and/or Engineer's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be identified herein or requested by Owner and/or Engineer.
- 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

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

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.

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 30 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.

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.

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 – EQUALIZATION BASIN NO. 3 AND 4, 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.
- 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 10 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

CONTRACTOR'S BID
FOR
CONSTRUCTION OF CONTRACT NO. 2020-001
EQUALIZATION BASIN NO. 3 AND 4
WAREHAM, MASSACHUSETTS

ARTICLE 1 - BID RECIPIENT

1.01. THIS BID IS SUBMITTED TO:

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

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

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.01. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01. In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data", and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06
- E. Bidder has considered 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 applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01. Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Article:
 - 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;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

- 5.01. Bidder will perform the Work in accordance with the Contract Documents for the prices shown in the Bid Schedule that follow.
 - 5.02. Bidder acknowledges that Bidder’s price(s) constitute Bidder’s sole compensation for performing all Work required by the Contract Documents, and if a particular part of the Work is not listed specifically in the Bid Item Descriptions, Bidder has included that part of the Work in the Bid Item Description which it most logically belongs.
- A. Schedule A: Lump Sum Bid Items: Lump sum items included all Work in the Contract Documents.

ITEM NO.	DESCRIPTION	TOTAL PRICE (IN FIGURES AND WORDS)
PART I – SCHEDULE OF BASE BID ITEMS – EQUALIZATION BASIN NO. 3 AND 4		
A1	Furnish and Install Equalization Basin No. 3 and 4	\$ _____ _____ _____

- B. Schedule B: Unit Price Bid Items: Not Applicable

C. Schedule C: Total Bid Price:

1. Determination of the apparent low Bidder shall be based on the Total Bid Price for the combined bid of Schedule A and B.
2. All mathematical errors will be corrected. In case of a discrepancy between unit prices bid and extended totals, unit prices will govern. In case of discrepancy between the correct sum of individual bid items and the (incorrectly) calculated sum, the correct sum of individual bid items will govern.
3. Discrepancies between the words and figures will be resolved in favor of the words.

ITEM NO.	TOTAL PRICE
Schedule C Total (Lump Sum Items)	\$
Total Bid Price	\$

TOTAL BID PRICE (in words)

ARTICLE 6 - TIME OF COMPLETION

- 6.01. Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02. Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 - ATTACHMENTS TO THIS BID

- 7.01. The following documents are submitted with and made a condition of this Bid:
 - A. Bidder's Qualification Statement
 - B. Non-Collusive Bidding Certification
 - C. Statement of Surety's Intent (if certified check or money order)
 - D. Required Bid Security in the form of a Bid Bond, certified check, or money order
 - E. Statement of Tax Compliance
 - F. OSHA Training Form

ARTICLE 8 - DEFINED TERMS

8.01. The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

9.01 Signature of Bidder and other appropriate information, if Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Signature of Individual)

Doing business as: _____

Business address: _____

Phone No. _____ FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

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

Name (typed or printed): _____

Business address: _____

Phone No. _____ FAX No.: _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

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

Name (typed or printed): _____

Title: _____

Attest: _____ (CORPORATE SEAL)
(Signature of Corporate Secretary)

Business address: _____

Phone No. _____ FAX No.: _____

Date of Qualification to do business is: _____

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venturer partner—attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No. _____ FAX No.: _____

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No. _____ FAX No.: _____

Phone and FAX Numbers, and Address for receipt of official communications:

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

BIDDER'S QUALIFICATION STATEMENT

To induce the making of this Contract, the Bidder represents to the Owner the following, as evidence of Bidder's Qualifications to perform the work herein specified. A minimum of five (5) municipal sewer related infrastructure projects of character similar shall have been completed in good standing; within the last seven (7) years by the Bidder.

1. How many years has your organization been in business under the name in which you propose to execute this Contract?
 ___ Years

2. What five (5) projects of character similar (as listed above) to that proposed has your present organization completed? Give the information indicated by the following tabulations:

NAME, ADDRESS, AND PHONE NO. OF OWNER FOR WHOM WORK WAS DONE	CONTACT NAME	DESCRIPTION OF WORK	APPROXIMATE AMOUNT OF CONTRACT	APPROXIMATE DATE WORK WAS DONE

3. Has your present organization ever failed to complete any work awarded to it? If so, state when, where and why.

4. Do you have, or can you procure the necessary personnel, equipment, facilities and financial resources to immediately undertake and satisfactorily complete the work contemplated in this Contract?

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

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.)

ATTACH BID SECURITY TO THIS PAGE
IF CERTIFIED CHECK

BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

BID

Bid Due Date:

Description (Project Name and Include Location):

BOND

Bond Number:

Date (Not earlier than Bid due date):

Penal sum

_____ (Words)

\$

_____ (Figures)

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

BIDDER

SURETY

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

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

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

STATEMENT OF STATE TAX COMPLIANCE

Project Name: EQUALIZATION BASIN NO. 3 AND 4

Pursuant to Ch. 233 of the Acts of 1983, §49A(b),

I, _____, acknowledge that I am the authorized signatory for
_____, whose principal place of business is at
_____, and as such, do hereby certify under the
pains of penalties of perjury that this company has complied with all laws of the Commonwealth relating to
taxes.

Social Security or Federal ID Number _____

Subscribed and sworn to this _____ day of _____, 20_____.

Notary Public

TOWN OF WAREHAM
CERTIFICATE OF LABOR HARMONY AND OSHA TRAINING

Project Name: **EQUALIZATION BASIN NO. 3 AND 4**

The undersigned certifies under penalties of perjury that the following LABOR HARMONY and OSHA TRAINING compliances will be met. As used in this certification, the words he or she shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

- That he or she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; and
- 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 for each employee.

(Signature of individual submitting bid or Sealed Bid)

(Name of business)

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 installation Equalization Basin No. 3 and 4 in accordance with the Bidding Documents heretofore prepared by GHD Inc.

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:

Equalization Basin No. 3 and 4
Contract 2020-01
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. **270 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 **300 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.
 - b. Exhibit "B"; Performance and Payment Bonds.
 - c. Exhibit "C"; Certificates of Insurance.
 - d. Exhibit "D"; Identification of Drawings.
 - e. Exhibit "E"; Contract Supplement.
 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

Contract 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. 11206142.

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:
 SE76-2607
 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

Town of Wareham Sewer Department
 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

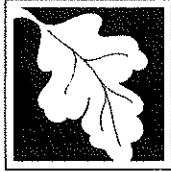
 d. Mailing Address

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

5. Project Location:
6 Tony's Lane Wareham
 a. Street Address b. City/Town

43 1000
 c. Assessors Map/Plat Number d. Parcel/Lot Number

Latitude and Longitude, if known: 41d45'm32.58"N 70d41'm01.92"W
 d. Latitude e. Longitude



Massachusetts Department of Environmental Protection
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A. General Information (cont.)

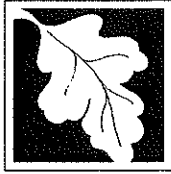
6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
 Plymouth
 a. County
 3330
 c. Book
 b. Certificate Number (if registered land)
 55
 d. Page
7. Dates: May 7, 2020 June 17, 2020 July 9, 2020
 a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance
8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):
 Town of Wareham MA, Equalization Basin Expansion, Site Plan Equalization Basins
 a. Plan Title
 GHD, Inc. Sandra L. Tripp
 b. Prepared By c. Signed and Stamped by
 May 6, 2020 1"=50'
 d. Final Revision Date e. Scale
 Sheets 112-06142-C002 & 111-06142-C003
 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. Public Water Supply b. Land Containing Shellfish c. Prevention of Pollution
 d. Private Water Supply e. Fisheries f. Protection of Wildlife Habitat
 g. Groundwater Supply h. Storm Damage Prevention i. 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.



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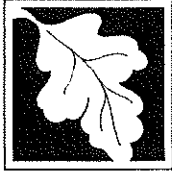
B. Findings (cont.)

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 checked="" type="checkbox"/> Riverfront Area	14,720 _____ a. total sq. feet	14,720 _____ 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	14,720 _____ g. square feet	14,720 _____ h. square feet	_____ i. square feet	_____ j. square feet



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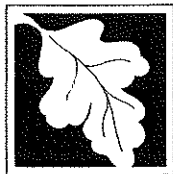
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B. Findings (cont.)

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	_____	_____		
	a. square feet	b. square feet		
	_____	_____		
	c. c/y dredged	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	_____	_____	_____ cu yd	_____ cu yd
	a. square feet	b. square feet	c. nourishment	d. nourishment
14. <input type="checkbox"/> Coastal Dunes	_____	_____	_____ cu yd	_____ cu yd
	a. square feet	b. square feet	c. nourishment	d. nourishment
15. <input type="checkbox"/> Coastal Banks	_____	_____		
	a. linear feet	b. linear feet		
16. <input type="checkbox"/> Rocky Intertidal Shores	_____	_____		
	a. square feet	b. square feet		
17. <input type="checkbox"/> Salt Marshes	_____	_____	_____	_____
	a. square feet	b. square feet	c. square feet	d. square feet
18. <input type="checkbox"/> Land Under Salt Ponds	_____	_____		
	a. square feet	b. square feet		
	_____	_____		
	c. c/y dredged	d. c/y dredged		
19. <input type="checkbox"/> Land Containing Shellfish	_____	_____	_____	_____
	a. square feet	b. square feet	c. square feet	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			
	_____	_____		
	a. c/y dredged	b. c/y dredged		
21. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	_____	_____		
	a. square feet	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):

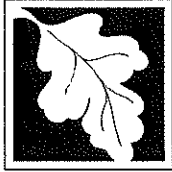
_____ a. number of new stream crossings

_____ 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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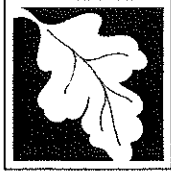
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C. General Conditions Under Massachusetts Wetlands Protection Act

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 SE76-2607 "
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.



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

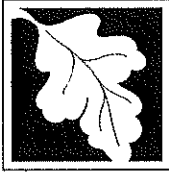
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Wareham
City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.
19. The work associated with this Order (the "Project")
- (1) is subject to the Massachusetts Stormwater Standards
- (2) is NOT subject to the Massachusetts Stormwater Standards

If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

- a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.
- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
- i.* all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
 - ii.* as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
 - iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;



Massachusetts Department of Environmental Protection
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WPA Form 5 – Order of Conditions

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

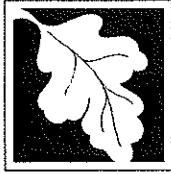
i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.
- h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
- i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
- j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
- k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
- l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.



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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? Yes No
2. The Wareham Conservation Commission hereby finds (check one that applies):
 - a. that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

1. Municipal Ordinance or Bylaw	2. Citation
---------------------------------	-------------

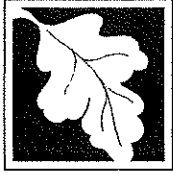
Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.
 - b. that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

<u>Wareham Wetland Protective Bylaw, Division VI</u>	
1. Municipal Ordinance or Bylaw	2. Citation
3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.
 The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

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.

9. **Upon completion of the project, or at the expiration date of the Order of Conditions, the applicant shall either submit a Request for a Certificate of Compliance accompanied by an "As-Built" Plan prepared by a professional engineer or land surveyor registered in the Commonwealth of Massachusetts showing deviations from the original submitted plans, if any, and showing the site has been developed according to the requirements of the Order of Conditions, or a request for an extension to the Order. Failure to comply with this condition may result in the issuance of fines and/or other legal actions.**
10. This Order shall apply to any successor in control or successor in interest of the property described in the Notice of Intent and accompanying plans.
11. If the proposed project involves construction of a replacement area, the replacement area shall meet or exceed those General performance standards outlines in sections 10.55 (4) (b) 1-7 of the Wetlands Protection Act Regulations. Should the replacement area fail to meet any of these standards, the Commission may require those measures necessary to achieve compliance.
12. **The applicant shall contact the Conservation Administrator to inspect the installed haybale/silt fence barrier. Both haybales and silt fence shall be used for this project. This is to be done prior to the commencement of the project, which includes tree cutting or the removal of vegetation.**
13. **The applicant shall arrange a preconstruction meeting to include the project contractor, the Conservation Administrator, and the project Engineer, to discuss the schedule and details of the project. This shall be done prior to the commencement of the project, which includes tree cutting or the removal of vegetation.**
14. **The name and phone number of the contact person for the project contractor shall be submitted to the Conservation Office. This shall be done prior to the commencement of the project.**
15. **Only organic slow release nitrogen fertilizer shall be used at the site, in accordance with the manufacturer's specifications. This shall be a continuing condition.**
16. **Any excess material generated from the project shall be removed from the site, or stored in area that is outside of any wetland resource areas or the buffer zones to any wetland resource areas.**



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:
 SE76-2593
 MassDEP File #

eDEP Transaction #
 Wareham
 City/Town

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.

July 9, 2020

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

1. Date of Issuance

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

5
 2. Number of Signers

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.

Signatures:

SSS

Mary E Taggart

[Signature]

[Signature]

by hand delivery on

by certified mail, return receipt requested, on

7020 0640 0000 6877 6744

Date

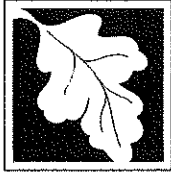
Date July 9, 2020

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.



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:
 SE76-2607
 MassDEP File #

eDEP Transaction #
 Wareham
 City/Town

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

DEP File Number: _____

Provided by DEP _____

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

A. Request Information

1. Location of Project

a. Street Address _____

b. City/Town, Zip _____

c. Check number _____

d. Fee amount _____

2. Person or party making request (if appropriate, name the citizen group's representative):

Name _____

Mailing Address _____

City/Town _____

State _____

Zip Code _____

Phone Number _____

Fax Number (if applicable) _____

3. Applicant (as shown on Determination of Applicability (Form 2), Order of Resource Area Delineation (Form 4B), Order of Conditions (Form 5), Restoration Order of Conditions (Form 5A), or Notice of Non-Significance (Form 6)):

Name _____

Mailing Address _____

City/Town _____

State _____

Zip Code _____

Phone Number _____

Fax Number (if applicable) _____

4. DEP File Number:

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



B. Instructions

1. When the Departmental action request is for (check one):

- Superseding Order of Conditions – Fee: \$120.00 (single family house projects) or \$245 (all other projects)
- Superseding Determination of Applicability – Fee: \$120
- Superseding Order of Resource Area Delineation – Fee: \$120



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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ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

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A Practice Division of the
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Endorsed by



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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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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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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SUPPLEMENTARY CONDITIONS

- 1. The locations of all existing conditions are approximate and are based on the Town of Wareham Assessors Maps 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. Water Pollution Control Facility Upgrade, Project No. M02-03, dated October 11, 2001.
- 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 Iyannough 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 [cite the rate book appropriate for the Project]. 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.”

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
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.

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- 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 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

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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 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

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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

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.

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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

Truck Rental @ \$50.00 per hour (for 3 hours) \$150.00

Total actual labor and materials	\$219.03
CONTRACTOR's Fee (15%)	<u>32.85</u>
Total Cost of Change Order	\$251.88

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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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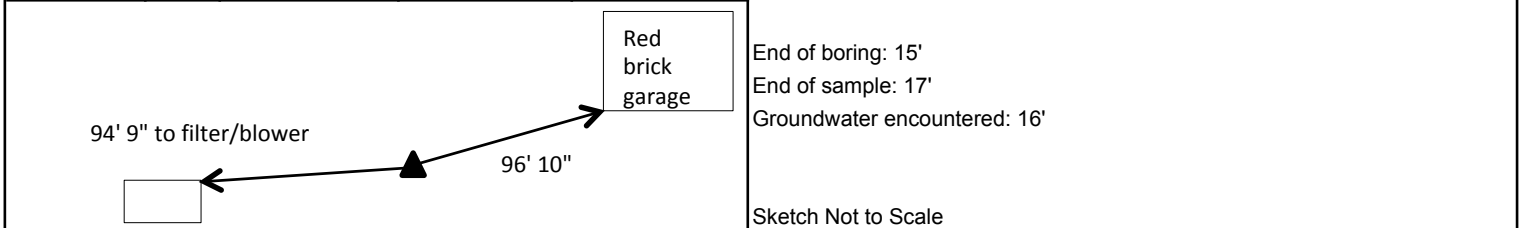
Appendix A
Soil Boring Logs

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.	Project GHD/Town of Wareham Town of Wareham WPFC Wareham, MA	Boring No. B1
		Sheet 1 of 1

Driller: Patrick Desmond	Boring location: Wareham WPFC
Helper: Derek Goodlin	Ground Surface Elevation:
Inspector: Craig Curtain	Date start: 12/12/2019 Date end: 12/12/2019

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: N/A Screen Size: N/A
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Depth (FT)	Sample				Sample Description	
	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
0			0 - 5		Vacuum truck. F-M brown sand, cobble. F-M-C brown sand, trace gravel. Dry.	
-1						
-2						
-3						
-4						
-5	1	24/16	5 - 7	4-9-10-10		F-M-C brown sand, trace gravel. Dry.
-6						
-7	2	24/16	7 - 9	7-7-7-7		F-M-C brown sand, trace gravel. Dry.
-8						
-9	3	24/20	9 - 11	2-4-6-6		F-M gray sand. Dry.
-10						
-11	4	24/22	11 - 13	4-4-4-5		F-M-C gray sand. Dry.
-12						
-13	5	24/19	13 - 15	4-4-5-5		F-M-C gray sand; trace gravel. Damp.
-14						
-15	6	24/20	15 - 17	4-4-5-3		F-M-C gray sand; trace gravel. Wet.
-16						
-17						
-18						
-19						
-20						
-21						
-22						
-23						
-24						
-25						
-26						
-27						



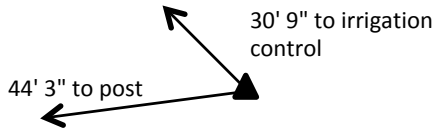
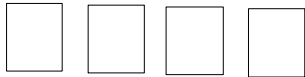
Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY		
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10% Little 10 - 20% Some 20 - 35% And 35 - 50%	■ - CONCRETE ■ - SAND PACK Z - SOIL BACKFILL ▨ - BENTONITE † - SCREEN ▽ - APPROX. WATER LEVEL
4 - 10	LOOSE	2 - 4	SOFT		
10 - 30	M. DENSE	4 - 8	M. STIFF		
30 - 50	DENSE	8 - 15	STIFF		
> 50	V. DENSE	15 - 30	V. STIFF		
		> 30	HARD		

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.	Project GHD/Town of Wareham Town of Wareham WPFC Wareham, MA	Boring No. B2
		Sheet 1 of 1

Driller: Patrick Desmond	Boring location: Wareham WPFC
Helper: Derek Goodlin	Ground Surface Elevation:
Inspector: Craig Curtain	Date start: 12/12/2019 Date end: 12/12/2019

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: N/A Screen Size: N/A
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Depth (FT)	Sample				Sample Description
	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
0			0 - 5		Vacuum truck. F-M-C brown sand. Dry.
-1					
-2					
-3					
-4					
-5	1	24/18	5 - 7	4-3-3-6	F-M-C light brown sand, trace gravel. Dry.
-6					
-7	2	24/18	7 - 9	5-6-6-6	F-M-C light brown sand, trace gravel. Dry.
-8					
-9	3	24/18	9 - 11	5-6-6-8	F-M-C light brown sand, trace gravel. Dry.
-10					
-11	4	24/18	11 - 13	3-4-6-7	F-M-C light brown sand, trace gravel. Dry.
-12					
-13	5	24/20	13 - 15	5-7-7-8	F-M-C light brown sand, trace gravel. Dry.
-14					
-15	6	24/18	15 - 17	4-6-6-6	F-M-C light brown sand, trace gravel. Dry.
-16					
-17	7	24/20	17 - 19	4-3-3-3	F-M-C light brown sand, trace gravel. Wet.
-18					
-19					
-20					
-21					
-22					
-23					
-24					
-25					
-26					
-27					



End of boring: 17'
End of sample: 19'
Groundwater encountered: 18'

Sketch Not to Scale

Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY		
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10% Little 10 - 20% Some 20 - 35% And 35 - 50%	■ - CONCRETE ■ - SAND PACK Z - SOIL BACKFILL ▨ - BENTONITE † - SCREEN ▽ - APPROX. WATER LEVEL
4 - 10	LOOSE	2 - 4	SOFT		
10 - 30	M. DENSE	4 - 8	M. STIFF		
30 - 50	DENSE	8 - 15	STIFF		
> 50	V. DENSE	15 - 30	V. STIFF		
		> 30	HARD		

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.		Project GHD/Town of Wareham Town of Wareham WPFC Wareham, MA		Boring No. B3	
				Sheet 1 of 1	
Driller: Patrick Desmond Helper: Derek Goodlin Inspector: Craig Curtain		Boring location: Wareham WPFC Ground Surface Elevation: Date start: 12/12/2019 Date end: 12/12/2019			
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches		Notes:		Auger Size: 6 1/4" x 4" H.S.A Casing Size: N/A Screen Size: N/A	
Depth (FT)	Sample				Sample Description
	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
0			0 - 5		Vacuum truck. F-M-C brown sand. Dry.
-1					
-2					
-3					
-4					
-5	1	24/13	5 - 7	12-11-10-5	F-M-C light brown sand, trace gravel and stone. Dry.
-6					
-7	2	24/12	7 - 9	6-7-7-6	F-M-C light brown sand, trace gravel and stone. Dry.
-8					
-9	3	24/17	9 - 11	5-7-5-4	F-M-C light brown sand, trace gravel and stone. Dry.
-10					
-11	4	24/16	11 - 13	2-2-4-4	F-M-C light brown sand and gravel. Dry.
-12					
-13	5	24/20	13 - 15	4-8-8-7	F-M-C light brown sand, trace gravel. Dry.
-14					
-15	6	24/18	15 - 17	8-11-17-16	F-M-C light brown sand and gravel. Dry.
-16					
-17	7	24/12	17 - 19	16-14-12-9	F-M-C light brown sand and gravel. Wet.
-18					
-19					
-20					
-21					
-22					
-23					
-24					
-25					
-26					
-27					
End of boring: 17' End of sample: 19' Groundwater encountered: 18'					
Sketch Not to Scale					
Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY		■ - CONCRETE
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%	■ - SAND PACK
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%	Z - SOIL BACKFILL
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%	▨ - BENTONITE
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%	⊕ - SCREEN
> 50	V. DENSE	15 - 30	V. STIFF		▽ - APPROX. WATER LEVEL
		> 30	HARD		
CAPE COD TEST BORING				BORING NO. B3	

Appendix B
Prevailing Wage Rates



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

Prevailing Wage Rates

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

CHARLES D. BAKER
Governor

ROSALIN ACOSTA
Secretary

KARYN E. POLITO
Lt. Governor

MICHAEL FLANAGAN
Director

Awarding Authority: Town of Wareham WPCF
Contract Number: **City/Town:** WAREHAM
Description of Work: Equalization Basins 3 and 4 - Construction of new lined equalization basins, distribution boxes and associated piping.
Job Location: 6 Tonys Lane, Wareham, MA 02571

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>	06/01/2020	\$35.15	\$12.41	\$13.72	\$0.00	\$61.28
	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>	06/01/2020	\$35.22	\$12.41	\$13.72	\$0.00	\$61.35
	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>	06/01/2020	\$35.34	\$12.41	\$13.72	\$0.00	\$61.47
	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>	08/01/2019	\$102.78	\$9.90	\$21.15	\$0.00	\$133.83
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	\$38.00	\$12.50	\$8.85	\$0.00	\$59.35
	12/01/2020	\$39.00	\$12.50	\$8.85	\$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"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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"						
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>	02/01/2020	\$54.40	\$10.75	\$21.94	\$0.00	\$87.09
	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 - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.20	\$10.75	\$21.94	\$0.00	\$59.89
2	60	\$32.64	\$10.75	\$21.94	\$0.00	\$65.33
3	70	\$38.08	\$10.75	\$21.94	\$0.00	\$70.77
4	80	\$43.52	\$10.75	\$21.94	\$0.00	\$76.21
5	90	\$48.96	\$10.75	\$21.94	\$0.00	\$81.65

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

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER	06/01/2020	\$48.81	\$13.00	\$15.70	\$0.00	\$77.51
<i>OPERATING ENGINEERS LOCAL 4</i>	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	06/01/2020	\$40.30	\$8.60	\$17.24	\$0.00	\$66.14
<i>LABORERS - FOUNDATION AND MARINE</i>	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	06/01/2020	\$39.15	\$8.60	\$17.24	\$0.00	\$64.99
<i>LABORERS - FOUNDATION AND MARINE</i>	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	06/01/2020	\$39.15	\$8.60	\$17.24	\$0.00	\$64.99
<i>LABORERS - FOUNDATION AND MARINE</i>	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	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
<i>LABORERS - ZONE 2</i>	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	03/01/2020	\$42.50	\$9.40	\$18.95	\$0.00	\$70.85
CARPENTERS -ZONE 2 (Eastern Massachusetts)	09/01/2020	\$43.15	\$9.40	\$18.95	\$0.00	\$71.50
	03/01/2021	\$43.75	\$9.40	\$18.95	\$0.00	\$72.10
	09/01/2021	\$44.40	\$9.40	\$18.95	\$0.00	\$72.75
	03/01/2022	\$45.00	\$9.40	\$18.95	\$0.00	\$73.35
	09/01/2022	\$45.65	\$9.40	\$18.95	\$0.00	\$74.00
	03/01/2023	\$46.25	\$9.40	\$18.95	\$0.00	\$74.60

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.25	\$9.40	\$1.73	\$0.00	\$32.38
2	60	\$25.50	\$9.40	\$1.73	\$0.00	\$36.63
3	70	\$29.75	\$9.40	\$13.76	\$0.00	\$52.91
4	75	\$31.88	\$9.40	\$13.76	\$0.00	\$55.04
5	80	\$34.00	\$9.40	\$15.49	\$0.00	\$58.89
6	80	\$34.00	\$9.40	\$15.49	\$0.00	\$58.89
7	90	\$38.25	\$9.40	\$17.22	\$0.00	\$64.87
8	90	\$38.25	\$9.40	\$17.22	\$0.00	\$64.87

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.58	\$9.40	\$1.73	\$0.00	\$32.71
2	60	\$25.89	\$9.40	\$1.73	\$0.00	\$37.02
3	70	\$30.21	\$9.40	\$13.76	\$0.00	\$53.37
4	75	\$32.36	\$9.40	\$13.76	\$0.00	\$55.52
5	80	\$34.52	\$9.40	\$15.49	\$0.00	\$59.41
6	80	\$34.52	\$9.40	\$15.49	\$0.00	\$59.41
7	90	\$38.84	\$9.40	\$17.22	\$0.00	\$65.46
8	90	\$38.84	\$9.40	\$17.22	\$0.00	\$65.46

Notes:
 % Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$30.26/ 3&4 \$36.18/ 5&6 \$54.64/ 7&8 \$60.62

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME	10/01/2019	\$27.95	\$7.07	\$7.86	\$0.00	\$42.88
CARPENTERS -ZONE 2 (Wood Frame)						

All Aspects of New Wood Frame Work

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Wood Frame) - Zone 2

Effective Date - 10/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$16.77	\$7.07	\$0.00	\$0.00	\$23.84
2	60	\$16.77	\$7.07	\$0.00	\$0.00	\$23.84
3	65	\$18.17	\$7.07	\$7.86	\$0.00	\$33.10
4	70	\$19.57	\$7.07	\$7.86	\$0.00	\$34.50
5	75	\$20.96	\$7.07	\$7.86	\$0.00	\$35.89
6	80	\$22.36	\$7.07	\$7.86	\$0.00	\$37.29
7	85	\$23.76	\$7.07	\$7.86	\$0.00	\$38.69
8	90	\$25.16	\$7.07	\$7.86	\$0.00	\$40.09

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$19.65/ 3&4 \$27.19/ 5&6 \$34.50/ 7&8 \$37.29

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

CHAIN SAW 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"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4	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"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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>	01/01/2020	\$50.96	\$8.20	\$22.10	\$0.00	\$81.26
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.48	\$8.20	\$0.00	\$0.00	\$33.68
2	55	\$28.03	\$8.20	\$5.94	\$0.00	\$42.17
3	60	\$30.58	\$8.20	\$6.48	\$0.00	\$45.26
4	65	\$33.12	\$8.20	\$7.02	\$0.00	\$48.34
5	70	\$35.67	\$8.20	\$18.86	\$0.00	\$62.73
6	75	\$38.22	\$8.20	\$19.40	\$0.00	\$65.82
7	80	\$40.77	\$8.20	\$19.94	\$0.00	\$68.91
8	90	\$45.86	\$8.20	\$21.02	\$0.00	\$75.08

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 2</i>	12/01/2019	\$39.30	\$8.10	\$16.60	\$0.00	\$64.00
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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
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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
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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
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR LABORERS - ZONE 2	12/01/2019	\$40.05	\$8.10	\$16.60	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER LABORERS - ZONE 2	12/01/2019	\$39.30	\$8.10	\$16.60	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR 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"						
DIVER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2019	\$68.52	\$9.90	\$21.15	\$0.00	\$99.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2019	\$48.94	\$9.90	\$21.15	\$0.00	\$79.99
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2019	\$73.41	\$9.90	\$21.15	\$0.00	\$104.46
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2019	\$102.78	\$9.90	\$21.15	\$0.00	\$133.83
For apprentice rates see "Apprentice- PILE DRIVER"						
ELECTRICIAN ELECTRICIANS LOCAL 223	03/01/2020	\$42.87	\$10.40	\$13.94	\$0.00	\$67.21

Apprentice - ELECTRICIAN - Local 223

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.15	\$10.40	\$0.51	\$0.00	\$28.06
2	42	\$18.01	\$10.40	\$0.54	\$0.00	\$28.95
3	45	\$19.29	\$10.40	\$0.58	\$0.00	\$30.27
4	48	\$20.58	\$10.40	\$5.22	\$0.00	\$36.20
5	50	\$21.44	\$10.40	\$5.26	\$0.00	\$37.10
6	55	\$23.58	\$10.40	\$5.63	\$0.00	\$39.61
7	60	\$25.72	\$10.40	\$5.93	\$0.00	\$42.05
8	65	\$27.87	\$10.40	\$6.25	\$0.00	\$44.52
9	70	\$30.01	\$10.40	\$6.54	\$0.00	\$46.95
10	75	\$32.15	\$10.40	\$6.79	\$0.00	\$49.34

Notes:

Steps are 750 hours

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

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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 <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	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"						
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"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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>	03/01/2020	\$42.87	\$10.40	\$13.94	\$0.00	\$67.21
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS LOCAL 223</i>	03/01/2020	\$36.27	\$10.40	\$11.78	\$0.00	\$58.45
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>	03/01/2020	\$47.05	\$9.40	\$19.25	\$0.00	\$75.70
	09/01/2020	\$47.85	\$9.40	\$19.25	\$0.00	\$76.50
	03/01/2021	\$48.65	\$9.40	\$19.25	\$0.00	\$77.30
	09/01/2021	\$49.45	\$9.40	\$19.25	\$0.00	\$78.10
	03/01/2022	\$50.25	\$9.40	\$19.25	\$0.00	\$78.90

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - FLOORCOVERER - Local 2168 Zone I

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.53	\$9.40	\$1.79	\$0.00	\$34.72
2	55	\$25.88	\$9.40	\$1.79	\$0.00	\$37.07
3	60	\$28.23	\$9.40	\$13.88	\$0.00	\$51.51
4	65	\$30.58	\$9.40	\$13.88	\$0.00	\$53.86
5	70	\$32.94	\$9.40	\$15.67	\$0.00	\$58.01
6	75	\$35.29	\$9.40	\$15.67	\$0.00	\$60.36
7	80	\$37.64	\$9.40	\$17.46	\$0.00	\$64.50
8	85	\$39.99	\$9.40	\$17.46	\$0.00	\$66.85

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.93	\$9.40	\$1.79	\$0.00	\$35.12
2	55	\$26.32	\$9.40	\$1.79	\$0.00	\$37.51
3	60	\$28.71	\$9.40	\$13.88	\$0.00	\$51.99
4	65	\$31.10	\$9.40	\$13.88	\$0.00	\$54.38
5	70	\$33.50	\$9.40	\$15.67	\$0.00	\$58.57
6	75	\$35.89	\$9.40	\$15.67	\$0.00	\$60.96
7	80	\$38.28	\$9.40	\$17.46	\$0.00	\$65.14
8	85	\$40.67	\$9.40	\$17.46	\$0.00	\$67.53

Notes: Steps are 750 hrs.
 % After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$32.36/ 3&4 \$38.80/ 5&6 \$58.01/ 7&8 \$64.50

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) 04/01/2019 \$34.71 \$13.20 \$16.55 \$1.93 \$66.39
 SHEETMETAL WORKERS LOCAL 17 - B

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) 03/01/2020 \$42.87 \$10.40 \$13.94 \$0.00 \$67.21
 ELECTRICIANS LOCAL 223

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) 04/01/2019 \$34.71 \$13.20 \$16.55 \$1.93 \$66.39
 SHEETMETAL WORKERS LOCAL 17 - B

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING -WATER) 03/02/2020 \$43.69 \$10.00 \$18.80 \$0.00 \$72.49
 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"

HVAC MECHANIC 03/02/2020 \$43.69 \$10.00 \$18.80 \$0.00 \$72.49
 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
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>	09/01/2019	\$43.60	\$12.80	\$16.40	\$0.00	\$72.80

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

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.80	\$12.80	\$11.90	\$0.00	\$46.50
2	60	\$26.16	\$12.80	\$12.80	\$0.00	\$51.76
3	70	\$30.52	\$12.80	\$13.70	\$0.00	\$57.02
4	80	\$34.88	\$12.80	\$14.60	\$0.00	\$62.28

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 37</i>	03/16/2020	\$40.61	\$7.70	\$17.10	\$0.00	\$65.41
	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 - 03/16/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	\$28.43	\$7.70	\$17.10	\$0.00	\$53.23
2	75	\$30.46	\$7.70	\$17.10	\$0.00	\$55.26
3	80	\$32.49	\$7.70	\$17.10	\$0.00	\$57.29
4	85	\$34.52	\$7.70	\$17.10	\$0.00	\$59.32
5	90	\$36.55	\$7.70	\$17.10	\$0.00	\$61.35
6	95	\$38.58	\$7.70	\$17.10	\$0.00	\$63.38

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

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER 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"

LABORER <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

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 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"

LABORER: CEMENT FINISHER TENDER 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"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 2	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 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: MULTI-TRADE TENDER 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"

LABORER: TREE REMOVER 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
 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"

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2020	\$41.49	\$10.75	\$20.12	\$0.00	\$72.36
	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 - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.75	\$10.75	\$20.12	\$0.00	\$51.62
2	60	\$24.89	\$10.75	\$20.12	\$0.00	\$55.76
3	70	\$29.04	\$10.75	\$20.12	\$0.00	\$59.91
4	80	\$33.19	\$10.75	\$20.12	\$0.00	\$64.06
5	90	\$37.34	\$10.75	\$20.12	\$0.00	\$68.21

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

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS, TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2020	\$54.42	\$10.75	\$21.93	\$0.00	\$87.10
	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 - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.21	\$10.75	\$21.93	\$0.00	\$59.89
2	60	\$32.65	\$10.75	\$21.93	\$0.00	\$65.33
3	70	\$38.09	\$10.75	\$21.93	\$0.00	\$70.77
4	80	\$43.54	\$10.75	\$21.93	\$0.00	\$76.22
5	90	\$48.98	\$10.75	\$21.93	\$0.00	\$81.66

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

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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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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 <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"

OILER (OTHER THAN TRUCK CRANES,GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	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) <i>OPERATING ENGINEERS LOCAL 4</i>	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 <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"

PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2020	\$50.96	\$8.20	\$22.10	\$0.00	\$81.26
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.48	\$8.20	\$0.00	\$0.00	\$33.68
2	55	\$28.03	\$8.20	\$5.94	\$0.00	\$42.17
3	60	\$30.58	\$8.20	\$6.48	\$0.00	\$45.26
4	65	\$33.12	\$8.20	\$7.02	\$0.00	\$48.34
5	70	\$35.67	\$8.20	\$18.86	\$0.00	\$62.73
6	75	\$38.22	\$8.20	\$19.40	\$0.00	\$65.82
7	80	\$40.77	\$8.20	\$19.94	\$0.00	\$68.91
8	90	\$45.86	\$8.20	\$21.02	\$0.00	\$75.08

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2020	\$41.86	\$8.20	\$22.10	\$0.00	\$72.16
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2020	\$41.21	\$8.25	\$22.40	\$0.00	\$71.86
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.93	\$8.20	\$0.00	\$0.00	\$29.13
2	55	\$23.02	\$8.20	\$5.94	\$0.00	\$37.16
3	60	\$25.12	\$8.20	\$6.48	\$0.00	\$39.80
4	65	\$27.21	\$8.20	\$7.02	\$0.00	\$42.43
5	70	\$29.30	\$8.20	\$18.86	\$0.00	\$56.36
6	75	\$31.40	\$8.20	\$19.40	\$0.00	\$59.00
7	80	\$33.49	\$8.20	\$19.94	\$0.00	\$61.63
8	90	\$37.67	\$8.20	\$21.02	\$0.00	\$66.89

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2020	\$39.92	\$8.20	\$22.10	\$0.00	\$70.22
PAINTERS LOCAL 35 - ZONE 2	07/01/2020	\$40.47	\$8.25	\$22.40	\$0.00	\$71.12
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.96	\$8.20	\$0.00	\$0.00	\$28.16
2	55	\$21.96	\$8.20	\$5.94	\$0.00	\$36.10
3	60	\$23.95	\$8.20	\$6.48	\$0.00	\$38.63
4	65	\$25.95	\$8.20	\$7.02	\$0.00	\$41.17
5	70	\$27.94	\$8.20	\$18.86	\$0.00	\$55.00
6	75	\$29.94	\$8.20	\$19.40	\$0.00	\$57.54
7	80	\$31.94	\$8.20	\$19.94	\$0.00	\$60.08
8	90	\$35.93	\$8.20	\$21.02	\$0.00	\$65.15

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

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) *	01/01/2020	\$40.46	\$8.20	\$22.10	\$0.00	\$70.76
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2020	\$41.01	\$8.25	\$22.40	\$0.00	\$71.66
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.23	\$8.20	\$0.00	\$0.00	\$28.43
2	55	\$22.25	\$8.20	\$5.94	\$0.00	\$36.39
3	60	\$24.28	\$8.20	\$6.48	\$0.00	\$38.96
4	65	\$26.30	\$8.20	\$7.02	\$0.00	\$41.52
5	70	\$28.32	\$8.20	\$18.86	\$0.00	\$55.38
6	75	\$30.35	\$8.20	\$19.40	\$0.00	\$57.95
7	80	\$32.37	\$8.20	\$19.94	\$0.00	\$60.51
8	90	\$36.41	\$8.20	\$21.02	\$0.00	\$65.63

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2020	\$38.52	\$8.20	\$22.10	\$0.00	\$68.82
PAINTERS LOCAL 35 - ZONE 2	07/01/2020	\$39.07	\$8.25	\$22.40	\$0.00	\$69.72
	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 - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.26	\$8.20	\$0.00	\$0.00	\$27.46
2	55	\$21.19	\$8.20	\$5.94	\$0.00	\$35.33
3	60	\$23.11	\$8.20	\$6.48	\$0.00	\$37.79
4	65	\$25.04	\$8.20	\$7.02	\$0.00	\$40.26
5	70	\$26.96	\$8.20	\$18.86	\$0.00	\$54.02
6	75	\$28.89	\$8.20	\$19.40	\$0.00	\$56.49
7	80	\$30.82	\$8.20	\$19.94	\$0.00	\$58.96
8	90	\$34.67	\$8.20	\$21.02	\$0.00	\$63.89

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2020	\$34.98	\$12.41	\$13.72	\$0.00	\$61.11
	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"	08/01/2019	\$48.94	\$9.90	\$21.15	\$0.00	\$79.99
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2019	\$48.94	\$9.90	\$21.15	\$0.00	\$79.99

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.47	\$9.90	\$21.15	\$0.00	\$55.52
2	60	\$29.36	\$9.90	\$21.15	\$0.00	\$60.41
3	70	\$34.26	\$9.90	\$21.15	\$0.00	\$65.31
4	75	\$36.71	\$9.90	\$21.15	\$0.00	\$67.76
5	80	\$39.15	\$9.90	\$21.15	\$0.00	\$70.20
6	80	\$39.15	\$9.90	\$21.15	\$0.00	\$70.20
7	90	\$44.05	\$9.90	\$21.15	\$0.00	\$75.10
8	90	\$44.05	\$9.90	\$21.15	\$0.00	\$75.10

Notes:

Apprentice to Journeyworker Ratio:1:5

PIPELAYER	06/01/2020	\$34.31	\$8.60	\$15.77	\$0.00	\$58.68
LABORERS - ZONE 2	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	03/02/2020	\$43.69	\$10.00	\$18.80	\$0.00	\$72.49
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 - 03/02/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.48	\$10.00	\$2.50	\$0.00	\$29.98
2	50	\$21.85	\$10.00	\$2.50	\$0.00	\$34.35
3	60	\$26.21	\$10.00	\$8.48	\$0.00	\$44.69
4	70	\$30.58	\$10.00	\$13.56	\$0.00	\$54.14
5	80	\$34.95	\$10.00	\$16.95	\$0.00	\$61.90

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

Notes:

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

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	03/02/2020	\$43.69	\$10.00	\$18.80	\$0.00	\$72.49
	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"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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>	05/01/2020	\$23.50	\$11.91	\$6.90	\$0.00	\$42.31
	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"						
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.Roofer Waterproofing &Roofer Damproofg) <i>ROOFERS LOCAL 33</i>	03/01/2020	\$45.67	\$11.50	\$15.90	\$0.00	\$73.07
	08/01/2020	\$47.10	\$11.50	\$15.90	\$0.00	\$74.50
	02/01/2021	\$48.53	\$11.50	\$15.90	\$0.00	\$75.93
	08/01/2021	\$49.96	\$11.50	\$15.90	\$0.00	\$77.36
	02/01/2022	\$51.39	\$11.50	\$15.90	\$0.00	\$78.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ROOFER - Local 33

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.84	\$11.50	\$3.69	\$0.00	\$38.03
2	60	\$27.40	\$11.50	\$15.90	\$0.00	\$54.80
3	65	\$29.69	\$11.50	\$15.90	\$0.00	\$57.09
4	75	\$34.25	\$11.50	\$15.90	\$0.00	\$61.65
5	85	\$38.82	\$11.50	\$15.90	\$0.00	\$66.22

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.55	\$11.50	\$3.69	\$0.00	\$38.74
2	60	\$28.26	\$11.50	\$15.90	\$0.00	\$55.66
3	65	\$30.62	\$11.50	\$15.90	\$0.00	\$58.02
4	75	\$35.33	\$11.50	\$15.90	\$0.00	\$62.73
5	85	\$40.04	\$11.50	\$15.90	\$0.00	\$67.44

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	03/01/2020	\$45.92	\$11.50	\$15.90	\$0.00	\$73.32
ROOFERS LOCAL 33	08/01/2020	\$47.35	\$11.50	\$15.90	\$0.00	\$74.75
	02/01/2021	\$48.78	\$11.50	\$15.90	\$0.00	\$76.18
	08/01/2021	\$50.21	\$11.50	\$15.90	\$0.00	\$77.61
	02/01/2022	\$51.64	\$11.50	\$15.90	\$0.00	\$79.04

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	04/01/2019	\$34.71	\$13.20	\$16.55	\$1.93	\$66.39
SHEETMETAL WORKERS LOCAL 17 - B						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-B

Effective Date - 04/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$13.88	\$13.20	\$4.02	\$0.95	\$32.05
2	45	\$15.62	\$13.20	\$4.52	\$1.02	\$34.36
3	50	\$17.36	\$13.20	\$10.48	\$1.26	\$42.30
4	55	\$19.09	\$13.20	\$10.48	\$1.31	\$44.08
5	60	\$20.83	\$13.20	\$13.52	\$1.43	\$48.98
6	65	\$22.56	\$13.20	\$13.78	\$1.49	\$51.03
7	70	\$24.30	\$13.20	\$14.03	\$1.55	\$53.08
8	75	\$26.03	\$13.20	\$14.28	\$1.61	\$55.12
9	80	\$27.77	\$13.20	\$14.54	\$1.67	\$57.18
10	85	\$29.50	\$13.20	\$14.79	\$1.72	\$59.21

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2020	\$35.44	\$12.41	\$13.72	\$0.00	\$61.57
	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>	06/01/2020	\$35.73	\$12.41	\$13.72	\$0.00	\$61.86
	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

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>	03/01/2020	\$36.27	\$10.40	\$11.78	\$0.00	\$58.45
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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223

Effective Date - 03/01/2020

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
Steps are 750hrs
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	02/01/2020	\$53.34	\$10.75	\$21.94	\$0.00	\$86.03
	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 - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.67	\$10.75	\$21.94	\$0.00	\$59.36
2	60	\$32.00	\$10.75	\$21.94	\$0.00	\$64.69
3	70	\$37.34	\$10.75	\$21.94	\$0.00	\$70.03
4	80	\$42.67	\$10.75	\$21.94	\$0.00	\$75.36
5	90	\$48.01	\$10.75	\$21.94	\$0.00	\$80.70

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

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
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>	06/01/2020	\$36.02	\$12.41	\$13.72	\$0.00	\$62.15
	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>	06/01/2020	\$35.44	\$12.41	\$13.72	\$0.00	\$61.57
	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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
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>	03/02/2020	\$43.69	\$10.00	\$18.80	\$0.00	\$72.49
	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"						

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 _____

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM



Company's Name:	Address:	Phone No.:	Payroll No.:
Employer's Signature:	Title:	Contract No:	Tax Payer ID Number
Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet Number

General / Prime Contractor's Name:		Subcontractor's Name:		"Employer" Hourly Fringe Benefit Contributions																
Employee Name & Complete Address	Work Classification:	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked								Project Hours (A) All Other Hours	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages		Check No. (H)
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	(B+C+D+E)							(A x F)	Total Gross Wages	

Are all apprentice employees identified above currently registered with the MA DLS's Division of Apprentices Standards? YES NO

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprentices Standards. No apprentices are identified above

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

Date Received by Awarding Authority / /
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SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Project - 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. Owner Occupancy.
- G. Sequence of Work.
- H. Operation to existing facilities.
- I. Connections to existing facilities.
- J. Alteration Project Procedures
- K. Cutting and Patching
- L. Facility outages.
- 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.

- 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 the WPCF site 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.

B. CONSTRUCTION SEQUENCE OF WORK

1. Contractor shall confirm all existing conditions and perform test pits per Contract Documents prior to construction.
2. Equalization Basins #3 and #4 liner installation and testing shall be completed before 20" piping is connected and before work on existing equalization basins is done.
3. Distribution Box 2 shall be connected to EQ Basin 3 and 4 and existing EQ basins and all of these facilities shall be completed and successfully tested before connecting Distribution Box 1 to the Equalization Basins #3 & 4.
4. Distribution Box 1 and related piping shall be installed and successful tested before contractor shall cut and connect to existing piping.
5. Allowed time out of service. Facilities are allowed to be out of service as follows:
 - a. Existing equalization basins – one shall remain in service at all times and a second may be out of service for a maximum of 8 hours total and only after providing Owner 7 days prior notice AND only after Owner agrees to schedule. Outages requiring more time shall utilize bypass pumps to temporarily transfer raw wastewater to the new Equalization Basins (Contractor shall clean new basins after use). Refer to Section 15140.
 - b. B. Wastewater Treatment Facility: Temporary pumping shall be conducted to maintain continuous operation of facilities while connection to existing piping is made. Refer to Section 01540 for bypass pumping requirements.

1.09. OPERATION OF EXISTING FACILITIES

- A. Normal operations of the existing facilities (water and sewer utilities) will be performed by Owner and are from 8:00 am to 4:30 pm. 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 suppliers 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.
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. Provide all temporary facilities required for outages, including bypassing pumping, in accordance with Specification Section 01500, Temporary Facilities and Section 01540, Temporary Pumping.
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.
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 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.

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. Terms

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. 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): Town of Wareham, MA	From (Contractor):	Via (Engineer): GHD Inc.
Project: Equalization Basin No. 3 and 4	Contract: Construction	
Owner's Contract No.: 2019-001	Contractor's Project No.:	Engineer's Project No.: 11206142

Application For Payment Change Order Summary

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

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

Contractor's Certification

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

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

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

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

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

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

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

Progress Estimate

Contractor's Application

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

Certificate of Substantial Completion

Project: Equalization Basin No. 3 and 4

Owner: Town of Wareham, MA	Owner's Contract No.: 2020-001
Contract: Construction	Engineer's Project No.: 11206142

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: Equalization Basin No. 3 and 4	Owner: Town of Wareham, MA	Owner's Contract No.: 2020-001
Contract: Construction	Date of Contract:	
Contractor:	Engineer's Project No.: 11206142	

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: Equalization Basin No. 3 and 4	Owner: Town of Wareham, MA	Owner's Contract No.: 2020-001
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 11206142

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.



REQUEST FOR INFORMATION
NO. _____

PROJECT:	Equalization Basin No. 3 and 4		
OWNER:	Town of Wareham, MA	CONTRACT NO.:	2020-001
ENGINEER:	GHD Inc.	ENGINEER PROJECT NO.:	11206142
CONTRACTOR:		CONTRACTOR PROJECT NO.:	
SUBJECT:		SPECIFICATION REFERENCE:	
		DRAWING REFERENCE:	

Information/Clarification Requested:

Name Signature Date

Engineer's Response:

Name Signature Date

Distribution: Contractor
Engineer
Field Office File

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. 2020-001 – EQUALIZATION BASIN NO. 3 AND 4, TOWN OF WAREHAM, MASSACHUSETTS

Bid Item No. and Title		Bid Item Description Number
1.	Furnish and Install Equalization Basin No. 3 and 4	A-1

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

A-1

LUMP SUM ITEM

BID ITEM 1

FURNISH AND INSTALL EQUALIZATION BASIN NO. 3 AND 4

- A. DESCRIPTION Under this item, furnish all materials, labor, tools, and construct the work associated with modifications to the Wareham WPCF as called for in the Contract Documents and as outlined below.
- B. WORK INCLUDED UNDER THIS ITEM All work as called for in the Contract Documents, including but not limited to:
Mobilization
Demobilization
Survey and site preparation
Erosion Control
Photos and Videos
Record Drawings
Site Restoration
Temporary Pumping
Earthwork, Cuts and Fills to subgrade
Sump/Cleanout Piping
20" Ductile Iron Piping
12" Ductile Iron Piping
Screen and Place Topsoil
Rake and Seed
Distribution Box 1
Distribution Box 2
Liner Installation – EQ Basin 3
Liner Installation – EQ Basin 4
And Connect to Existing 20" Piping
Gravel Course
Wearing Course
Binder Course
6" Ductile Iron Piping
Water Cannons
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Work not pertaining to modifications to the Wareham WPCF per Contract Documents.
- D. METHOD OF PAYMENT Payment for this Item will be a monthly percentage payment based on an approved schedule values.
- E. MEASUREMENTS AND LIMITS Payment for this Item will be made as an approved percentage completed on a monthly basis.

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 Contractor's responsibility to coordinate all Work on the project. 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. Samples.
- H. Manufacturer's instructions.
- I. Manufacturer's certification.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each required submittal in electronic form using an Engineer accepted form. Once submittal is "Accepted", "Accepted as Corrected", or "No Resubmittal Required", transmit three hard copy submittals, complete, for the record.
- 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 three submittals (two resubmittals) 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 10 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. Description
- B. Construction photographs.
- C. Construction videography.
- D. 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. Interior of tanks prior to filling with liquid.
 11. Installation of all interior and exposed exterior piping, equipment, and electrical components.
 12. Testing of all piping, equipment, and systems.
 13. 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 / drone 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 two CDs with electronic versions of all images captured in the past month.
 3. Provide two CDs 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 CDs 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 USB Flash Drive 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 USB Flash Drive 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. Tests and inspections – Contractor provided.
- F. Manufacturers' field services.

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
 - 3. Section 02229 – PAVEMENT SUBGRADE
 - 4. Section 02231 – AGGREGATE BASE COURSE
 - 5. Section 02510 – ASPHALT CONCRETE PAVING
- 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 Electricity.
- C. Temporary Lighting.
- D. Temporary Water Service.
- E. Temporary Sanitary Facilities.
- F. Barriers.
- G. Fencing.
- H. Water Control.
- I. Exterior Enclosures.
- J. Interior Enclosures.
- K. Protection of Installed Work.
- L. Security.
- M. Parking.
- N. Progress Cleaning.
- O. Pollution Controls.
- P. Removal of Utilities, Facilities, and Controls.
- Q. Contractors Field Office.

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.
- 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, pigtails, 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 8:00 a.m. and 4:30 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 01540
TEMPORARY PUMPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnishing, installing, and testing temporary pumping systems.

1.02. GENERAL

- A. Provide all materials, labor, equipment, power, maintenance, associated items, and superintendence to implement temporary pumping systems for diverting flow as required to maintain continuous operation of existing facilities prior to successful Startup of new facilities. Section 01010, Summary of Work, identifies specified facility outages that may require temporary pumping. Provide all additional temporary pumping systems needed to meet Contractor's means and methods at no additional cost to Owner.
- B. Contractor shall provide temporary pumping as needed for at least two uses as follows:
 - 1. From the three secondary clarifier troughs to denitrification filters influent channel. Pumps shall be capable of pumping peak flows of up to 3 mgd and shall match plant flows.
 - 2. From the existing equalization basins to the new equalization basins and from the new equalization basins to the existing equalization basins. Pumps shall be capable of pumping peak flows of up to 5.5 mgd

1.03. SUBMITTALS

- A. Submit Shop Drawings in accordance with Section 01300, Submittals as supplemented herein.
- B. Submit a specific detailed description of each proposed temporary pumping system at least 30 days prior to intended use. The submittal shall include, but not be limited to, the following:
 - 1. A written description of the plan.
 - 2. Quantity, capacity, and location of all pumping equipment.
 - 3. Pump performance curves and head capacity curves demonstrating the capability to meet all required flows.
 - 4. The size, type and routing of all suction and discharge piping and the means of connecting the system.
 - 5. Description of controls and emergency power source.
- C. Engineer's review will be limited to verification of compliance with performance requirements only. Owner will review temporary pumping system submittals with respect to maintenance of plant operations.

1.04. TEMPORARY PUMPING COORDINATION MEETING

- A. After Owner and Engineer review of temporary pumping system submittal(s), and at least 14 days prior to intended use, schedule a coordination meeting with the Owner, Engineer, Contractor, and Subcontractor or temporary pump Supplier, if applicable.
- B. No temporary pumping shall take place until after satisfactory completion of the associated coordination meeting.

1.05. PERFORMANCE REQUIREMENTS

- A. Design the installation and operation of temporary pumping systems in accordance with Laws and Regulations, including local noise and light ordinances.
- B. Provide fuel supply for 48 hours of operation on Site and stored in accordance with Laws and Regulations. Assume responsibility for all spills and regulatory fines due to failure of the temporary pumping system.
- C. Temporary pumping systems shall be designed to pump peak capacity with largest unit out of service as follows:
- D. Provide a backup pump on-site and ready for operation of the same capacity as the largest temporary bypass pump. In addition, one of the following two conditions must be met:
 - 1. The temporary pumping system must be manned continuously (24 hours per day, 7 days per week) during operation by a representative of the Contractor trained and certified by the pump Supplier. In the event of a pump failure, the Owner shall be notified within 15 minutes and the temporary backup pump shall be placed into service within one hour of the pump failure.
 - 2. As an alternative to 24/7 manned operation, install, test, and maintain remote telemetry to monitor operation of the temporary pump(s) and the wet well level(s). Notify Owner within 15 minutes of a pump and/or system failure. Report to Site within 30 minutes of a pump and/or system failure, and place the temporary backup pump in service within one hour of a pump and/or system failure. The telemetry system shall notify up to 6 individuals in a specific order and the contact phone numbers shall be coordinated with and provided to the Owner.
 - 3. For temporary pumping system with automatic backup pump operation, report to Site within 30 minutes of a pump failure to ensure the automatic backup system is operating properly.
- E. Temporary pumping systems shall be equipped with noise reduction features that limit the noise output to 65 db[A] within 50 feet of the equipment or to 60 db[A] at the nearest residence property line, whichever is less.
- F. Provide variable speed pumps or drives where required to meet temporary pumping requirements.
- G. See Section 01010, Summary of Work, for facility outage requirements and constraints.

1.06. SPECIAL PRECAUTIONS

- A. Contractor is responsible for fines levied on Owner by state, federal, and/or other agencies due to spills caused by failure of temporary pumping systems.

- B. Provide Jersey barriers in all locations where temporary pumps, piping, and other accessories are located in roadways, driveways, and other vehicle-accessed areas.
- C. Provide security fencing for all temporary pumps where not located within a secured area.

PART 2 PRODUCTS

2.01. PUMPS

- A. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the required flow ranges without surging, cavitation, or vibration. Where required pumping rates are not specified, coordinate with Engineer to determine required pumping range prior to submitting associated Shop Drawings. Pumps shall not overload drivers at any point on the pump operating curve. Pumps shall be suitable for use with raw unscreened sewage and trash being pumped. Pumps shall be self-contained units designed for temporary use.
- B. Pumps shall either have fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system, or they shall be submersible.
- C. The pumps shall be diesel powered or powered by a diesel powered generator.
- D. Provide the necessary start/stop and level controls for each pump.

2.02. PIPING

- A. In order to prevent the accidental spillage, all temporary piping must be constructed of rigid or semi-rigid pipe with positive, leak-proof connections. All pipe materials and joints for temporary piping systems must be accepted by Engineer prior to use.
- B. Pipe 12 inches and larger shall be ductile iron or fused joint high density polyethylene pipe to provide a leak-proof piping system. Flanged joints shall be used for exposed or submerged ductile iron pipe. Pipe joints shall be accepted by Engineer prior to use for temporary ductile iron pipe.
- C. Provide heat tracing of temporary piping as required to prevent freezing.

2.03. TEMPORARY PLUGS

- A. Provide temporary plugs, as required, for successful operation of the temporary pumping systems.
- B. Plugs shall be inflatable and designed for the specific purpose of providing temporary plugging of active pipes
- C. All plugs shall be firmly attached to a stationary object at ground level by a steel cable in order to prevent loss of plugs in pipelines.

2.04. PIPE SUPPORTS

- A. Provide temporary pipe supports as necessary.
- B. Pipe support type and location shall be indicated in the Shop Drawing submittals.

PART 3 EXECUTION

3.01. GENERAL REQUIREMENTS

- A. Install, operate and maintain temporary pumping systems and appurtenances, including but not limited to, associated piping, valves, instrumentation, controls, and accessories, in accordance with the manufacturer's instructions. Provide all oil, fuel, grease, lubricants, tools, and spare parts required for operation and maintenance of the temporary pumping systems for the duration of use. Remove all temporary pumping systems and appurtenances equipment following the completion of temporary pumping.
- B. Contractor is responsible for proper operation of complete temporary pumping systems.
- C. Adequate hoisting equipment for each pump and accessory shall be maintained on the Site.
- D. Provide hay bales and tarping systems to enclose all exterior pumps and engines to further reduce noise levels.
- E. Demonstrate all temporary pumping systems to Owner and/or Engineer for conformance with the Contract Documents prior to use. Measure the noise output during the demonstration phase and provide the results to Engineer.
- F. Temporary pumping systems shall be placed in service a minimum of 72 hours before any work requiring use of the temporary pumping system may begin. Demonstrate continuous trouble-free operation for entire 72 hours period.
- G. Temporary pumping systems shall remain operable until all components of new work requiring temporary pumping systems have successfully completed all required testing. Once activated, do not decommission without prior approval of the Owner and Engineer.
- H. Once written permission is issued by the Engineer, remove all components of the temporary pumping systems. After removal of temporary pumping systems, perform all restoration work to the satisfaction of the Owner.
- I. Take precautions to prevent spills when cutting pipelines or decommissioning existing piping.

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 02229 – PAVEMENT SUBGRADE
- E. 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. Change in location or elevations of Underground Facilities installed under this Contract.
 - h. Change in materials, such as pipe materials.
 - i. Relocation of existing Underground Facilities.
 - j. Change in topographical contours of finished earth and paved surfaces.
 - k. 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.
- 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 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.
- C. Final payment to Contractor will not be considered until acceptable record documents have been turned over to Owner."

1.04. SUBMITTALS

- A. Contractor shall submit a "DRAFT" record drawing in both PDF and AutoCAD format. The newly installed items shall be presented in a bold or darker format than the background existing conditions plan. The record drawings, at a minimum, shall include:
1. Clearly denoted locations, sizes, and materials of all pipes using similar symbols as the design plans.
 2. Locations of all new and modified catch basins, manholes, and other structures with invert tables showing the orientation of all pipes entering and exiting the structure including existing grade elevation, invert elevations, material, diameter and direction of all pipes within the structure.
 3. Revised topography of the project area with a minimum 10-foot grid for areas of elevation change. Topography shall be shown as 1-foot contours on the record drawings with incremental spot elevations.
- B. Contractor shall submit draft copies of record drawings for Engineer's and Owner's review. Engineer shall issue written copies of all comments for incorporation into the final record drawings.
- C. Draft record drawings are due 30 calendar days after substantial completion is issued. Final record drawings are due 20 calendar days after Engineer issues written comments to Contractor.
- D. Final record drawings shall be stamped and signed by a licensed professional land surveyor or professional engineer in the State of Massachusetts.
- E. Engineer shall furnish copies of the AutoCAD design files for use in preparation of record drawings upon request. It is the Contractors responsibility to verify accuracy of all elements displayed on the record drawings.

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 process 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 02112 – PAVEMENT CUTTING
- H. Section 02222 – EXCAVATING
- I. 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 walls and floors where utilities are removed.
- 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. Paint designated metal surfaces and reinforcing steel exposed by demolition operations.
- K. Remove temporary barricades, partitions, signs, etc.
- L. Remove and dispose of residual materials such as grit, sludge, debris, trash, and other scrap.
- M. 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 02112 – PAVEMENT CUTTING
- D. 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 be coordinated with the Owner.
- 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 02112
PAVEMENT CUTTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pavement cutting.
- B. Pavement scoring.
- C. Pavement (concrete) breaking.
- D. Pavement grinding.
- E. Pavement removal and disposal.

1.02 REFERENCES

- A. MassDOT - Manual of Uniform Traffic Control Devices.

1.03 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01500 – TEMPORARY FACILITIES
- C. Section 02110 – SITE CLEARING
- D. Section 02510 – ASPHALT CONCRETE PAVING
- E. Section 02576 – PAVEMENT PATCHING

1.04 REGULATORY REQUIREMENTS

- A. Coordinate pavement cutting with utility companies.
- B. Conform to applicable local and state codes for legal disposal of pavement materials.
- C. Refer to Section 02110 for requirements of disposal of surplus material.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify local officials, Fire, and Police Departments of streets to be blocked off, detours, or restrictions to maintaining of traffic on a daily basis.

- B. Set up barricades, warning signs, and traffic direction information prior to start of pavement cutting.

3.02 PAVEMENT CUTTING AND BREAKING

- A. Pavements covering those areas to be excavated shall be broken up, removed, and then disposed of in accordance with Article 1.04 above. All paved areas shall be first cut or scored continuously along a straight line, parallel to and on each side of the centerline of the trench or excavation, at a width sufficient for the trench excavation or structure excavation.
- B. Pavement cuts in concrete pavement or pavement with a concrete base shall be made by scoring or cutting the concrete with a concrete saw. The depth of the saw cut shall be to the full depth of the concrete pavement thickness. Before excavation, the concrete pavement shall then be broken up with hand operated, pneumatic paving breakers, or mechanical drop hammers designed for such purpose, providing they may be used without endangering existing utilities or causing undesirable vibrations. "Headache balls" will not be permitted for breaking up concrete pavement.
- C. Pavements cuts in blacktop pavement shall be made by scoring or cutting the pavement with a concrete saw, wheel cutter, pneumatic paving breaker, or drop hammer type pavement cutter. The pavement cut must be continuous, and made for the full depth of the pavement.
- D. Pavement cuts for final pavement replacement shall be made as outlined above. Pavement cuts shall be made parallel to the centerline of the trench, shall be located at a minimum of 12 inches outside the backfilled trench on undisturbed subgrade, and shall be in a straight line for minimum length of 100 feet between manholes or between those stations where changes in direction of the installed piping were made. Where a full street width overlay is to be installed the cutbacks may follow the backfilled trench alignment. Loose, torn, cut, marked-up, or damaged pavement outside the cutback areas shall be removed and replaced at the Contractor's expense and match the proposed permanent paving.
- E. Pavement cuts in driveways shall be made in a straight alignment perpendicular or parallel to the driveway and for its full width.
- F. Pavement cuts in parking areas shall be made in a straight alignment parallel to the centerline of trench.

3.03 PAVEMENT GRINDING

- A. Where shown on the Contract Drawings, the Contractor shall remove a portion of an existing pavement including Portland cement concrete pavement, asphalt Portland cement concrete pavement base course, to the limits and profile specified by grinding, milling, or planing methods. This process shall yield a base upon which a final pavement course will be applied. The Contractor shall employ equipment especially designed and manufactured for the grinding, milling, or planing of pavements.
- B. The resulting ground, milled, or planed surface shall be thoroughly cleaned and free from dust, loose pavement material, or other material. The surface shall be free from gouges, large cracks, and unsound, soft, or broken-up areas. Gouges from lack of proper control of the grinding, milling, or planing machine shall be made level and true by the use of a trueing and leveling course of asphalt concrete if allowed by the Engineer. Cracks greater than 1/4-inch shall be cleaned and filled in accordance with Mass DOT requirements. Unsound, soft, or broken-up areas shall be excavated and repaired in accordance with Section 02576.

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.
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	

TYPE	TYPE D-1 M2.01.7	TYPE D-2 M2.01.3	TYPE D-3 M2.01.1
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
- D. Section 02229 – PAVEMENT SUBGRADE

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, 02229, and 02231.

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 in accordance with Section 02229.
- 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 02229
PAVEMENT SUBGRADE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Subgrade preparation.
- B. Furnishing natural soils.
- C. Furnishing select borrow material.
- D. Temporary drainage.
- E. Compaction.
- F. Proofrolling.
- G. Removal and replacement of unacceptable materials.
- H. Grading.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01300 – SUBMITTALS
- C. Section 01400 – QUALITY CONTROL
- D. Section 01500 – TEMPORARY FACILITIES
- E. Section 02110 – SITE CLEARING
- F. Section 02112 – PAVEMENT CUTTING
- G. Section 02205 – PROTECTION OF EXISTING FACILITIES
- H. Section 02223 – BACKFILLING
- I. Section 02228 – COMPACTION

1.03 REFERENCES

ASTM D698	Moisture/Density Relations of Soil/Aggregate Mixtures Using 5.5 Lb. Rammer and 12 In. Drop
ASTM D1557	Moisture/Density Relations of Soils and Soil/Aggregate Mixtures Using 10 Lb. Rammer and 18 In. Drop

1.04 DEFINITIONS

- A. "Subgrade" shall be defined as the foundation layer of natural soils or select borrow material that supports the pavement layers.

1.05 PERFORMANCE REQUIREMENTS

- A. Compaction of subgrade shall meet the requirements for compaction as stated in Section 02228, Table 1.
 - 1. Compaction curves shall be developed for each type of subgrade material when "in-place density" tests are required by the Engineer.
 - 2. The cost of failed compaction tests will be reimbursed by the Contractor.
- B. Proof-rolling with 8- to 10-ton pneumatic tire compactors to locate areas of inadequate compaction or soft or rutting areas or other defects in the subgrade surface.

1.06 SUBMITTALS

- A. Submit under Provisions of Section 01300.
- B. Select Borrow Material - Refer to Section 02223.
- C. Granular Materials - Refer to Section 02223.

1.07 PROJECT RECORD DOCUMENTS

- A. None.

1.08 REGULATORY REQUIREMENTS

- A. Conform to permit requirements obtained by Owner and attached to these Specifications.
- B. Conform to regulatory agencies having jurisdiction over the work.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Provide erosion and sediment controls (refer to Section 01564) to prevent debris, stones and silt from entering drainage systems.

1.10 FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings, notify Engineer of specific differences.
- B. Prior to start of construction, where ordered, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02205.

1.11 COORDINATION

- A. Coordinate field work under provisions of Division 1, including maintenance of traffic, access to private driveways, and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal) including the appropriate organization identified in Section 02205.
- C. Coordinate shutdown of existing utility systems, including streets and/or driveways with local authorities. Notify affected property owners and industries at least 24 hours prior to shutdown including duration of shutdown if so approved by local authorities. Maintain one travel lane at all times; if this is not possible, coordinate with Wareham Fire and Police Departments.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Natural on-site soils, if suitable, shall be utilized.
- B. Borrow materials, if required, shall be Type E-2 as specified in Section 02223.
- C. Granular materials, if required, shall be as specified in Section 02223. The type, size, and quantity of granular material shall be that required to prepare a compacted subgrade approved by the Engineer.
- D. All products to be installed per the depths and thicknesses shown on the construction details within the drawings.

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.
- E. All underground utility installations, including culverts, shall be completed, backfilled and compacted prior to completion of subgrade.
- F. Verify that traffic controls and erosion and sediment controls are in place.

3.02 PREPARATION

- A. Temporary erosion and sediment controls shall be installed prior to construction of subgrade. See Section 01564.
- B. Temporary drains and ditches shall be constructed as necessary to remove water from the subgrade area.
 - 1. Temporary drainage openings in existing catch basins may be made in a manner acceptable to the Engineer. Such openings to be repaired to the satisfaction of the Engineer.
 - 2. Contractor to prevent the entrance of debris, stones and silt from entering drainage systems, including the use of bales of hay, screens, and other desilting methods.
- C. Backfilled areas shall be retested at the discretion of the Engineer.

3.03 INSTALLATION

- A. Construct the subgrade by cutting or filling with natural on-site soils or borrow material.
 - 1. The final subgrade surface shall be fine graded, rolled, and compacted to form a smooth, even surface.
- B. The subgrade in fill section shall be placed in maximum 6-inch layers before compaction and compacted before the next layer is spread.
- C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.
 - 1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select on-site material acceptable to the Engineer.
 - 2. Where no suitable on-site is available, granular materials shall be installed and compacted.

3.04 FIELD QUALITY CONTROL

- A. Contractor shall perform field inspection and testing under provisions of Section 01400 and as identified in this specification.
- B. For compaction requirements, refer to Article 1.05 and Section 02228, Table 1.
- C. One test shall be performed for every 75 linear feet (or fraction thereof) of asphalt road to be placed, or for every 100 square feet of parking lot.
- D. Tolerances - The final subgrade surface shall not vary more than +1/2 inch from the design grade elevation at any location, parallel to the final road surface as defined by the total roadway thickness.

E. Proof Rolled - Prior to the placement of the next pavement course, the subgrade surface shall be proof rolled to locate areas of inadequate compaction or defections or soft or rutting areas requiring undercutting, with 8- to 10-ton pneumatic tire compactors.

1. Areas of inadequate compaction to be recompact.
2. If additional rolling does not correct an area of unstable condition, then this area and soft or rutted areas shall be removed and replaced with select on-site material and compacted.
3. Where no suitable on-site material is available, granular materials shall be installed and compacted; areas inaccessible to rollers to be compacted by mechanical methods.

3.05 DUST CONTROL

A. Dust control shall be accomplished by using water, brooming, and cleaning methods to satisfaction of the Owner.

1. Dust control shall be carried out on a daily basis including weekends and holidays. Refer to Division 1.

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course roads, driveways, walks, and parking areas.
- B. Compaction.
- C. Fine grading.
- D. Testing.
- E. Tolerances.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01300 – SUBMITTALS
- C. Section 01400 – QUALITY CONTROL
- D. Section 01500 – TEMPORARY FACILITIES
- E. Section 01564 – EROSION CONTROL
- F. Section 02223 – BACKFILLING
- G. Section 02228 – COMPACTION
- H. Section 02229 – PAVEMENT SUBGRADE
- I. Section 02510 – ASPHALT CONCRETE PAVING

1.03 REFERENCES

ANSI/ASTM D1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb Rammer and 18 inch Drop
ANSI/ASTM D1556	Density of Soil in Place by the Sand Cone Method
ASTM D4318	Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
	Nuclear Moisture-Density Testing by "Probe" Methods

1.04 DEFINITIONS

- A. "Aggregate base course" shall be defined as the foundation course of the subsequent pavement layers.

1.05 PERFORMANCE REQUIREMENTS

- A. Compaction of aggregate base course shall meet the requirements of Section 02228.
 - 1. Compaction curves shall be developed for each type of aggregate base course material when "in-place" density tests are required by the Engineer.
 - 2. The cost of failed compaction tests will be reimbursed by the Contractor.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit aggregate base course materials.
 - 1. Certified sieve analysis with the following quality tests:
 - a. Soundness.
 - b. Plasticity Index.
 - c. Elongated Particle.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Provide erosion and sediment controls. Refer to Sections 01564 and 02229.

1.08 COORDINATION

- A. Coordinate field work under provisions of Section 01010, including maintenance of traffic, access to private driveways, and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal) including owners of other existing utilities for location and protection thereof.
- C. Coordinate shutdown of streets and/or driveways with local authorities. Notify effected property owners and industries at least 24 hours prior to shutdown including duration of shutdown if so approved by local authorities.

PART 2 PRODUCTS

2.01 OFF-SITE MATERIALS

- A. Aggregate Base Course - As described in Section 02223 and as shown on the Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify pavement subgrade has been accepted for placement of aggregate base course.
 - 1. Gradients, crowns, and elevations are correct.

2. Subgrade is dry.
 3. Geotextile is in place.
- B. Verify that traffic controls are in place.

3.02 INSTALLATION

- A. Spread aggregate over prepared subgrade and geotextile to a total compacted thickness as shown on the Drawings.
- B. Place aggregate in 8 inch maximum layers and compact.
- C. Level and contour surfaces to elevations and gradients shown.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Compact placed aggregate materials to achieve compaction to 95 percent of its maximum dry density in accordance with ASTM D1557.
- F. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03 TOLERANCES

- A. Flatness - Maximum variation of 1/4-inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness - Within 1/4-inch.
- C. The final base course surface shall be free from holes, bumps, waves, and corrugations.
 1. Surface shall be parallel to the final surface course and have a tolerance of +3/8-inch of its design gradient and elevation.

3.04 FIELD QUALITY CONTROL

- A. Contractor shall perform field inspection and testing under provisions of Section 01400.

3.05 PROTECTION

- A. In the event the subbase is used for maintenance of traffic or is disturbed or loosened by any cause, then prior to placing of the next paving course, the subbase shall be regraded and recompact to its finished grade and specified density.

3.06 DUST CONTROL

- A. Dust control shall be accomplished by using water, brooming, and cleaning methods. Dust control shall be carried out on a daily basis including weekends and holidays to the satisfaction of the Owner. See Section 01010.

END OF SECTION

SECTION 02400

HDPE GEOMEMBRANE LINER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Qualifications for the manufacturer of the high density polyethylene (HDPE) geomembrane.
- B. Submittals and certifications for the polymer supplier and geomembrane manufacturer.
- C. Quality control testing of geomembrane liners.
- D. Installation requirements for geomembrane liners.
- E. Warranties for the materials covered in this section.

1.02 RELATED SECTIONS

- A. Section 02401 – QUALITY ASSURANCE HDPE GEOMEMBRANE

1.03 REFERENCES

- A. Documents
 - 1. USEPA Technical Guidance Document - Quality Control Assurance and Quality Control for Waste Containment Facilities, EPA/600/R-93/182, September 1993, 305 pages.
- B. Quality Control Testing Standards
 - 1. Geosynthetic Research Institute (GRI)
 - a. GM10 - Specification for the Stress Crack Resistance of Geomembrane Sheet.
 - b. GM11 - Accelerated Weathering of Geomembranes Using a Fluorescent UVA-Condensation Exposure Device.
 - c. GM13 - Test Properties, Testing Frequency, and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - b. ASTM D1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - c. ASTM D1238 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

- d. ASTM D1505 - Standard Test Method for Density of Plastics by The Density Gradient Technique.
- e. ASTM D1603 - Standard Test Method for Carbon Black in Olefin Plastics.
- f. ASTM D3895 - Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Colorimetry.
- g. ASTM D4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
- h. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
- i. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
- j. ASTM D5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
- k. ASTM D5596 - Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- l. ASTM D5721 - Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.
- m. ASTM D5885 - Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry.
- n. ASTM D5994 - Standard Test Method for Measuring the Core Thickness of Textured Geomembranes.
- o. ASTM D6365 – Standard Practices for the Nondestructive Testing of Geomembrane Seams Using the Spark Test.
- p. ASTM D6693 – Standard Test Method for Determining Tensile Properties of Non-Reinforced Polyethylene and Non-Reinforced Flexible Polypropylene Geomembranes.
- q. ASTM D7466 – Standard Test Method for Measuring Asperity Height of Textured Geomembranes.

1.04 DEFINITIONS

- A. Polymer Supplier
 - 1. Retained by the manufacturer.
 - 2. Shall supply raw polymer which meets the specifications to the manufacturer.
 - 3. Shall provide submittals and certifications as specified.

B. Manufacturer

1. Retained by the Contractor or Installer.
2. Shall use approved polymer as supplied by the polymer supplier to manufacture geomembrane materials which meet the specifications.
3. Shall provide submittals and certifications as required.
4. Shall provide written warranties as required.
5. Shall provide a tour of the manufacturing facility, including observation of the manufacture of the materials provided specifically for the project, if requested by the Owner and/or Engineer.

C. Transporter

1. Retained by manufacturer, installer, or Contractor.
2. May be the manufacturer or installer.
3. Responsible to transport synthetic rolls from the Manufacturer to the Installer at the project site without damage.

D. Installer

1. Retained by the manufacturer or General Contractor.
2. Can be the manufacturer.
3. Responsible to take the acceptable materials which have been delivered to the site and install them in accordance with the plans and specifications.
4. Shall provide a field crew foreman and seaming foreman.

E. Field Crew Foreman

1. Retained by the installer.
2. Responsible for all activities associated with the installation of the geomembrane.
3. Shall be on-site during all aspects of geomembrane installation.
4. Shall be responsible for subgrade acceptance, handling, placement, seaming, testing, repairing and all other activities performed by the installer.

F. Seaming Foreman

1. Retained by the installer.
2. May be the field crew foreman.
3. Responsible for all seaming activities associated with construction of the geomembrane materials.

4. Shall be installer's representative at daily meetings.
- G. Seaming Crew
1. Retained by the installer.
 2. Responsible for the seaming of individual geomembrane sheets or panels.

1.05 SUBMITTALS

Shop drawings shall be submitted as specified in Section 01300 Submittals. The Contractor shall be responsible for the following submittals:

- A. Experience Submittals After Award, Prior to Shipping
1. Manufacturer
 - a. Shall have a minimum of 10 years of continuous experience in manufacturing polyethylene geomembrane and shall provide a list documenting no less than 40 completed facilities totaling a minimum of 20,000,000 square feet for which the manufacturer has manufactured geomembranes. For each facility the following information shall be provided:
 - i. Name and purpose of the facility.
 - ii. The location and date of installation.
 - iii. The name of the Owner, the project manager, designer, fabricator (if any), and the installer.
 - iv. The name and telephone number of the contact at the facility who can discuss the project.
 - v. In addition, the geomembrane type, thickness, and total square footage of the installation surface should be included.
 2. Installer
 - a. A list documenting at least 20 completed facilities for which the installer has completed the installation of a geomembrane totaling a minimum of 20,000,000 square feet. For each facility the following information shall be provided:
 - i. The name and purpose of the facility, its location, and the date of installation.
 - ii. The name of the project manager, designer, manufacturer, and fabricator (if any).
 - iii. The name and qualifications of the supervisor(s) of the installer's crew(s).
 - iv. The type(s) of seaming, patching, and tacking equipment.

- v. Any available information on the performance of the lining system at the facility.
 - b. A list documenting at least 10 completed facilities for which the installer has completed the installation of a 60 mil high density polyethylene geomembrane totaling a minimum of 10,000,000 square feet. For each facility, the following information shall be provided:
 - i. The name and purpose of the facility, its location, and the date of installation.
 - ii. The name of the project manager, designer, manufacturer, and fabricator (if any).
 - iii. The name and qualifications of the supervisor(s) of the installer's crew(s).
 - iv. The type(s) of seaming, patching, and tacking equipment.
 - v. Any available information on the performance of the lining system at the facility.
 - c. Certification indicating an approval or license from the manufacturer to install the manufacturer's materials.
 - 3. Polymer Supplier - Documentation indicating that the polymer supplier has previously produced a minimum of 2,000,000 lbs of polymer of the same composition as that proposed for use in the manufacture of the 60 mil geomembranes.
- B. Quality Control Submittals After Award, Prior to Shipping
- 1. Manufacturer
 - a. Copies of quality control certificates for each roll or panel of geomembrane. Each quality control certification shall include: (a) roll or panel number(s) and identification; and (b) certification that each roll was continuously inspected for uniformity, damage, imperfections, holes, cracks, thin spots and foreign materials. Additionally, the geomembrane liner must be inspected for tears, punctures and blisters.
 - b. Certification that the geomembrane supplied for this work was manufactured as consecutive rolls from a single lot or from consecutive lots. If geomembrane is not manufactured from consecutive lots, resin manufacturer shall provide certification of resin quality and consistency of characteristics.
 - c. Certification that the geomembrane and extrudate, if applicable, produced for this work have the same properties and are of the same resin.
 - d. Reports of quality control tests conducted to verify conformance with Table 1 found at the end of this section.
 - e. If requested by the Engineer, the Quality Control procedures utilized in the geomembrane manufacturing process.

- f. Origin and identification of the resin, including the resin supplier's name and production plant and resin brand name and type.
- g. Copies of quality control certificates issued by the resin supplier.
- h. Reports of resin testing conducted to verify conformance with Table 1.

2. Installer

- a. Certification that the field crew foreman has a minimum of 20,000,000 square feet of actual geomembrane installation experience and a minimum of 10,000,000 square feet of supervisory experience for geomembrane installation on a minimum of 10 different projects.
- b. Certification that the seaming foreman has a minimum of 10,000,000 square feet of actual geomembrane seaming experience and a minimum of 5,000,000 square feet of supervisory experience during the seaming of geomembrane materials.
- c. Certification that each individual on the seaming crew has a minimum of 1,000,000 square feet of geomembrane seaming experience and a minimum of 500,000 square feet of seaming experience with 60 mil polyethylene geomembranes.

3. Raw Materials

- a. Origin and identification of the resin, including the resin supplier's name and production plant and resin brand name and type.
- b. Copies of quality control certificates issued by the resin supplier which shall include testing conducted to verify conformance with Table 1.

4. Transporter - Certification that the transporter has transported a minimum of 5,000,000 square feet of geomembrane materials.

C. Submittals After Award, Prior to Installation

1. Manufacturer

- a. Proposed Installation Panel Layout Drawing
 - i. Drawing shall show the location and reference number of all panels and expected seams.
 - ii. Drawing shall include all necessary details, including the order of panel installation.
 - iii. No horizontal seams shall be allowed on slopes greater than 5 percent.
 - iv. No horizontal seams shall be allowed within 5 feet of the toe of any side slope.
 - v. In corners and odd-shaped geometric locations, the number of field seams shall be minimized.

- vi. A drawing for each liner shall be supplied.
- 2. Installer - Documentation outlining installation quality control requirements and procedures.
- D. Submittals During Installation
 - 1. Copies of seaming quality assurance records which shall include apparatus temperature, extrudate temperature, if applicable, and ambient air temperature.
 - 2. Copies of quality assurance certificates which shall include:
 - a. Panel numbers and identification.
 - b. Quality assurance test locations, procedures and results.
 - c. Documentation of repairs, including location and retest results.

1.06 PROJECT RECORD DOCUMENTS

- A. Record drawing(s) for each panel layout diagram (two prints, one reproducible).
- B. Summary and log of all quality assurance testing performed.
- C. Summary and log of the ambient temperature at which seaming was performed, in addition to geomembrane surface temperature and seam wedge temperature, recorded every two hours during placement and seaming.
- D. A listing of any precipitation events occurring at the site, including time of such occurrences, the intensity and the amount of the event.

1.07 QUALITY ASSURANCE

- A. Preinstallation Conference - The General Contractor shall convene a preinstallation conference with the Owner's representative a minimum of five days before installation begins.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery
 - 1. Transportation of the geomembrane rolls to the job site is the responsibility of the transporter.
 - 2. The geomembranes shall be rolled and covered with an appropriate material.
 - 3. The geomembrane rolls shall be labeled with the following information:
 - a. Name of manufacturer.
 - b. Product type.
 - c. Manufacturer's batch code.
 - d. Date of manufacture.

- e. Physical dimensions.
 - f. Panel number.
 - g. Direction of unrolling.
4. Any damaged rolls shall remain on the transport vehicle for return to the point of origin.
- B. Storage
- 1. All geomembranes shall be stored so as to be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, light, excessive heat, or other damage.
 - 2. Rolls and panels shall be stored on a prepared surface (not wooden pallets) and shall not be stacked.
- C. Handling
- 1. The General Contractor shall provide adequate handling equipment for moving geomembrane rolls which do not pose any risk of damage to the rolls.
 - 2. The General Contractor shall be responsible for the onsite unloading of all geomembrane materials.
 - 3. No geomembrane material shall be unloaded without the field crew foreman present.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Adequate loading (e.g., sand bags, tires or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind. In case of high winds, continuous loading is recommended along edges of panels to minimize wind flow under the panels.
- B. Geomembranes shall not be placed or seamed:
- 1. During precipitation, during periods of fog, or in the presence of excess moisture (e.g., dew, ponded water).
 - 2. During periods of excessive winds (>20 mph) or when gusting wind conditions interfere with handling operations.
 - 3. When ambient air temperatures are lower than 32 degrees F or higher than 120 degrees F.
 - 4. When sheet temperatures are lower than 32 degrees F or higher than 158 degrees F.

1.10 WARRANTY

- A. The manufacturer shall warranty materials for a minimum of 20 years.
- B. The installer shall warranty workmanship for a minimum of one year.

1.11 REMOVAL AND DISPOSAL OF EXISTING GEOSYNTHETICS

- A. Remove and dispose of existing geomembrane and geotextile that cannot be salvaged at a permitted solids waste management facility.

PART 2 MATERIALS

2.01 MANUFACTURER

- A. The following is a list of manufacturers with the capacity to provide the geomembrane specified in this section:
 - 1. Solmax
 - 2. Agru America, Inc.
- B. The above is a short list and may not be the only manufacturers who can provide acceptable materials.

2.02 MATERIALS

- A. Geomembrane
 - 1. The geomembrane shall be manufactured of new, first-quality resin and shall be compounded and continuously manufactured specifically for this work. The resin manufacturer shall certify each batch for the acceptance criteria listed in Table 1.
 - 2. Shall meet or exceed the acceptance criteria in Table 1.
 - 3. Shall not contain more than 1 percent non-volatile pigment or fillers other than carbon black.
 - 4. Factory seaming of geomembrane panels shall not be performed.
- B. Pipe Boots - May be constructed in the factory or in the field in accordance with the detail shown on the Drawings.

2.03 SOURCE QUALITY CONTROL

- A. The manufacturer and polymer supplier shall perform the material testing as specified in Table 1, found at the end of this section.

PART 3 MATERIAL

3.01 EXAMINATION

- A. The Installation Contractor's field crew foreman shall inspect all subgrades to receive geomembrane materials on a daily basis for projections or voids which may cause damage to the liner during installation. Report any changes in subgrade conditions which require repair to the Engineer.

- B. Inspect all geomembrane rolls or panels upon delivery.
 - 1. Each roll or panel shall carry a label; which identifies, as a minimum, the thickness of the material, the manufacturer, batch and roll or panel identification numbers and the width and length of the roll or panel.
 - 2. Inspect the surface of all rolls and/or panels for defects and damage. Rolls and/or panels with severe flaws shall be rejected.

3.02 PROTECTION

- A. Direct contact with geomembranes shall be minimized. Geomembrane in heavy traffic areas shall be protected by a cushion geosynthetic overlay.
- B. Equipment and tools shall not damage the geomembrane as a result of handling, trafficking, excessive heat or other means.
- C. Personnel working on the geomembrane shall not smoke, wear damaging shoes, excessively traffic or engage in other activities which may damage the geomembrane.
- D. No vehicular equipment shall be driven directly on a geomembrane.

3.03 PLACEMENT

- A. Place geomembrane rolls as indicated on the panel layout diagram.
 - 1. Geomembrane shall only be placed on subgrades which have been inspected and accepted in writing by the Installation Contractor's field crew foreman.
 - 2. Only those rolls or panels which can be seamed or permanently anchored on at least two sides on the same day they are placed shall be removed from protective packaging on a daily basis. All other sides shall be temporarily anchored.
 - 3. Geomembrane rolls or panels should be placed in an orderly fashion which shall minimize or prevent surface water from flowing below previously installed geomembrane.
 - 4. Field seams shall be oriented parallel to the line of slope.
- B. Unroll geomembrane from the tube and position for seaming.
 - 1. The method used to unroll the geomembrane shall not cause scratches or crimps in the geomembrane and shall not damage the underlying natural or geosynthetic material.
 - 2. The method used to place the geomembrane shall minimize wrinkles but provide sufficient slack in the geomembrane based on the time of year and weather conditions to prevent tension in the geomembrane during cold temperatures.
 - 3. The geomembrane shall be cut from each roll with a hookblade knife.

3.04 SEAMS

- A. All surfaces to be seamed shall be clean and free of moisture, dust, dirt, grease and other foreign substances.

- B. Seams shall be aligned with the least possible number of wrinkles and “fishmouths.”
 - 1. Wrinkle or fishmouths at seam overlaps shall be cut along the ridge of the imperfection, flattened, and repaired.
- C. Seams shall have a finished overlap of a minimum of 6 inches for dual wedge fusion welding, but in any event, sufficient overlap shall be provided to allow peel tests to be performed on the seam.
- D. If applicable, the procedure used to temporarily bond adjacent panels together shall not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any spot welding apparatus shall be controlled such that the geomembrane is not damaged.
- E. Seaming shall be accomplished using dual hot wedge fusion welding and extrusion (fusion) welding seams.
- F. A movable protective layer shall be used below each overlap of geomembrane during field seaming to prevent the buildup of moisture between the sheets.
- G. All field seaming operations shall be supervised by the seaming foreman and no field seams shall be made without the seaming foreman present.

3.05 TRIAL SEAMS

- A. Trial seams shall be performed on fragment pieces of geomembrane to verify that seaming conditions are satisfactory and to supply test specimens for the quality assurance program.
- B. Trial seams shall be conducted at the beginning of each seaming period, at least once every four hours, and after significant changes in geomembrane temperature for each seaming apparatus used that day. Trial seams shall be made under the identical conditions as the actual seams.
- C. Each seamer shall make at least one trial seam each day for each seam method (see paragraph 3.04.E).
- D. Trial seams shall be a minimum of 42 inches in length and 1 foot in width, with the seam centered in the 1-foot width.
- E. Two test specimens shall be cut from each trial seam at one third the distance from each end. Specimen size shall satisfy testing requirements listed in Table 1 of Section 02401, Quality Assurance HDPE Geomembrane.
- F. Both test specimens shall immediately be tested for peel and shear strength as outlined in Table 1 of Section 02401, Quality Assurance HDPE Geomembrane.
- G. If either specimen does not meet the acceptance criteria, the seamer and seaming apparatus and/or methods shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive trial seams are successful.
- H. The remaining end sections shall be retained, one by the Owner and one by the General Contractor and stored at room temperature in a light-free environment.

3.06 FAILED TESTS

- A. If any test specimen does not meet the acceptance criteria listed in Table 1, the test series shall be considered unacceptable and all material or length of seam represented by the test series shall be rejected. The installer may, at no additional compensation, take additional samples for quality control testing in an attempt to minimize the amount of material represented by the failed test.
- B. An acceptable length of seam shall be defined as a length of seam which lies between acceptable destructive test locations and has passed non-destructive seam testing.

3.07 DEFECTS AND REPAIRS

- A. All seams and non-seam areas of the geomembrane shall be inspected by the field crew foreman for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be brushed, blown or washed by the General Contractor if the amount of dust or mud inhibits inspection. The Engineer shall decide if cleaning of the geomembrane is needed to facilitate inspection.
- B. Each suspect location in seam and non-seam areas shall be non-destructively tested, as appropriate, in the presence of the field crew foreman. Each location that fails the non-destructive testing shall be marked by the field crew foreman and repaired accordingly.
- C. No material shall be placed over a repaired section of geomembrane prior to completion of all destructive and non-destructive testing and acceptance of the repair.
- D. Punctures, pin holes, small tears and localized imperfections shall be repaired using a patch.
- E. Large tears and lengths of seam shall be repaired using a cap strip. No reseaming over existing seams shall be permitted.
- F. Large wrinkles which exist at the end of seaming operations and which may become creased during backfilling shall be cut and resealed.
- G. Patches and cap strips shall have rounded edges (minimum radius of 3 inches), shall be made of the same geomembrane, and shall extend a minimum of 6 inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane provided for this work. Patches shall be seamed using extrusion (fusion) welding.
- H. Tears which lie on slopes greater than 5% or which lie in areas of stress and have sharp ends shall have all sharp ends rounded prior to repair.
- I. The geomembrane below large patches and cap strips shall be cut as necessary to prevent moisture or gas collection between sheets.
- J. All repair seams shall be made in accordance with the requirements of Article 3.04 of this section.
- K. Each repair shall pass non-destructive tests. Large cap strips may require destructive testing, as directed by the Engineer.

3.08 PIPE BOOT LEAK TESTING

- A. All pipe boot seams shall be spark tested. Acceptable pipe boots shall show no spark.
- B. Alternative testing methods may be allowed, as determined by the Engineer.

3.09 GEOMEMBRANE ACCEPTANCE

- A. The Contractor shall retain all ownership and responsibility for the geomembrane until final acceptance of all work under this contract by the Owner.
- B. The geomembrane liner shall be accepted by the Owner when all of the following conditions are met:
 - 1. Installation is finished.
 - 2. Verification of the adequacy of all field seams and repairs, including associated testing.
 - 3. Certification, including record drawing(s), is provided by the General Contractor to the Owner's representative.
 - 4. Required warranties are received.

3.10 GEOMEMBRANE ANCHOR SYSTEM

- A. Install an anchor system to prevent uplift of the exposed geomembrane after installation.
 - 1. Anchor system shall consist of sand filled geomembrane tubes placed as shown on the drawings.
 - 2. Geomembrane tube material shall provide similar UV resistance to the pond liner geomembrane.
 - 3. Verify tube diameter will provide adequate uplift resistance based on the proposed spacing.
 - 4. Place upper end of ballast tubes into anchor trench as required to secure ballast tube.

(continued)

TABLE 1

QUALITY CONTROL TESTING REQUIREMENTS

TEST DESCRIPTION	TEST METHOD	MINIMUM TEST FREQUENCY	MINIMUM AVERAGE TEST VALUES, TEXTURED 60 MIL
Raw Materials Testing			
Melt Flow Index	ASTM D1238	1/50,000 lbs	≤1.0 grams/10 min
Manufacture Testing			
Thickness, mils (textured) Minimum average Lowest individual of 8 of 10 readings Lowest individual of 10 readings	ASTM D5994	Per roll	57 54 51
Asperity height, mils	ASTM D7466	Every other roll	10
Sheet density, g/cc	ASTM D1505/ ASTM D792	1/60,000 SF	0.940
Tensile properties ⁽¹⁾ Yield strength, lb/in Break strength, lb/in Yield elongation, % Break elongation, %	ASTM D6693	1 test series each MD and XMD per 20,000 SF	126 90 12 100
Tear resistance, lb	ASTM D1004	1/45,000 lbs	42
Puncture resistance, lb	ASTM D4833	1/50,000 SF	90
Stress crack resistance ⁽²⁾ , hours	ASTM D5397	Per GRI GM10	250
Carbon black content ⁽³⁾ , %	ASTM D1603	1/20,000 lbs	2.0 to 3.0
Carbon black dispersion ⁽⁴⁾	ASTM D5596	1/45,000 lbs	Category 1 or 2
Oxidation induction time (OIT) ⁽⁵⁾ (a) Standard OIT, minutes or (b) High pressure OIT, minutes	ASTM D3895 ASTM D5885	1/200,000 lbs	100 400
Oven aging at 85°C ^(5,6) (a) Standard OIT (% retained after 90 days) or (b) High pressure OIT (% retained after 90 days)	ASTM D5721 ASTM D3895 ASTM D5885	Per each formulation	55 80

TEST DESCRIPTION	TEST METHOD	MINIMUM TEST FREQUENCY	MINIMUM AVERAGE TEST VALUES, TEXTURED 60 MIL
UV resistance ⁽⁷⁾ (a) Standard OIT or (b) High pressure OIT (% retained after 1,600 hours) ⁽⁹⁾	GRI GM11 ASTM D3895 ASTM D5885	Per each formulation	N.R. ⁽⁸⁾ 50

- (1) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of five test specimens each direction.
 Yield elongation is calculated using a gage length of 1.3 inches.
 Break elongation is calculated using a gage length of 2.0 inches.
- (2) The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
- (3) Other methods such as D4218 or microwave methods are acceptable if an appropriate correlation to D1603 (tube furnace) can be established.
- (4) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
- (5) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
- (6) It is also recommended to evaluate samples at 30 and 60 days to compare to the 90-day response.
- (7) The condition of the test should be 20-hour UV cycle at 75°C followed by 4-hour condensation at 60°C.
- (8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
- (9) UV resistance is based on percent retained value regardless of the original HP-OIT value.

END OF SECTION

SECTION 02401

QUALITY ASSURANCE HDPE GEOMEMBRANE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Conduct quality assurance sampling and testing.
- B. Produce reports of field testing data, associated documentation, and logs in a timely manner.

1.02 RELATED SECTIONS

- A. Section 02400 - HDPE GEOMEMBRANE LINER

1.03 REFERENCE MATERIALS

- A. Reference Standards - Annual Book of ASTM Standards, American Society for Testing and Materials.
 - 1. ASTM D-4437, "Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes."
 - 2. ASTM D-5641, "Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber."
 - 3. ASTM D-5820, "Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes."
 - 4. ASTM D-6392, "Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods."

1.04 TEST REPORTS

- A. Provide to the Engineer reports of data from field test data generated from the required sampling and testing procedures.
 - 1. Each report shall certify that the test methods were performed in accordance with those specified for this work.
 - 2. Each report shall reference the test sample number(s).
- B. Provide a quality assurance testing summary at the completion of the work.

PART 2 MATERIALS AND PRODUCTS

Not used.

PART 3 EXECUTION

3.01 PREPARATION

- A. Review testing parameters, requirements, and anticipated schedules to assure that adequate personnel and proper equipment will be available.

3.02 QUALITY ASSURANCE SAMPLING AND TESTING

- A. Quality assurance sampling and testing of geosynthetic materials shall be performed after installation of a roll of material to verify that the mechanical characteristics of the seams will not compromise the geomembrane integrity. Quality assurance information and test results shall be provided to the Contractor and Engineer as soon as they are available.

3.03 QUALITY ASSURANCE TESTING SUMMARY

- A. The General Contractor shall prepare a landfill geomembrane quality assurance testing summary which shall consist of the following:
 - 1. For each liner, a separate copy of the Panel Layout Drawing shall be utilized and shall indicate the liner represented.
- B. On each sheet, the following information shall be recorded:
 - 1. The location and identification number of each imperfection, the date found and the date repaired.
 - 2. The location, date, sample number and test result (acceptable/unacceptable) of each destructive test series.
 - 3. The location, identification number and date of each nondestructive air pressure seam test including the length of the tested seam and the result of the test (acceptable/unacceptable).
 - 4. The location, date and lengths of nondestructive vacuum box testing performed on a daily basis.

(continued)

TABLE 1

QUALITY ASSURANCE TESTING REQUIREMENTS FOR SEAMING

TEST DESCRIPTION	TEST METHOD	MINIMUM TEST FREQUENCY	ACCEPTANCE CRITERIA
<i>Destructive Tests</i> ^(1,2)			
Peel Strength	ASTM D-4437 or ASTM D-6392	None; only used for trial welds ⁽³⁾	>88 lb/in and FTB
Shear Strength	ASTM D-4437 or ASTM D-6392	None; only used for trial welds	>120 lb/in

- (1) All destructive test results based on Film-Tear Bond (FTB) criteria. All samples which produce seam failures shall be considered unacceptable.
- (2) A minimum of one series of destructive tests shall be performed for each machine each day that seaming is performed.
- (3) Peel strength testing shall be performed on both Weld A and Weld B.

END OF SECTION

SECTION 02507

TEMPORARY PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary paving of roads, streets, driveways, parking areas, and walks.
- B. Schedule.
- C. Compaction.
- D. Maintenance.
- E. Tolerances.

1.02 RELATED SECTIONS

- A. Section 01039 – COORDINATION
- B. Section 01300 – SUBMITTALS
- C. Section 02223 – BACKFILLING
- D. Section 02228 – COMPACTION
- E. Section 02231 – AGGREGATE BASE COURSE

1.03 REFERENCES

- A. MassDOT Standard Specifications for Highways and Bridges, as amended.
- B. Massachusetts Manual of Uniform Traffic Control Devices.

1.04 SUBMITTALS

- A. None.

1.05 COORDINATION

- A. Coordinate field work under provisions of Section 01500, including maintenance of traffic, access to private driveways, and emergency vehicle access.

PART 2 PRODUCTS

2.01 TEMPORARY PAVING MATERIAL

- A. Temporary paving to consist of the following:
 - 1. Temporary paving shall be HMA Base Course mix, thickness as shown on the Drawings.

2. All materials shall be in accordance with MassDOT Specification Section 420.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that backfill and aggregate base has been compacted and graded in accordance with Sections 02223, 02228, and 02231.
- B. Verify that traffic controls are in place.

3.02 PREPARATION

- A. Install traffic control devices in accordance with the Massachusetts Manual of Uniform Traffic Control Devices.
- B. Excavate, fill, grade, and compact the subgrade to a smooth, stable condition prior to placing of the temporary paving.

3.03 INSTALLATION

- A. The temporary paving shall match the slope, grade, and alignment of the original pavement.
- B. The temporary paving shall match the elevation of the adjacent surface and to continue the existing drainage pattern.
- C. Compact temporary paving to the Engineer's satisfaction with tandem rollers or equivalent and of sufficient size and number to compact the asphalt concrete while it is still hot and in a workable condition.
 1. Rolling shall continue until all roller marks and creases are removed.
 2. At the Engineer's discretion, confined area or small sections of pavement may be compacted by mechanical means.

3.04 TOLERANCES

- A. Flatness - Maximum variation of 3/4-inch measured by a 10-foot straight edge.
- B. Scheduled Compacted Thickness - Within 1/4-inch.

3.05 SCHEDULE

- A. Place temporary paving over all trenches in streets, driveways, and parking areas as soon as the backfilling and compaction operations have been completed.
 1. In any event, required surfaces shall be temporarily paved by each Friday afternoon prior to the weekend shutdown of construction activity. In the event of inclement weather forecasted for Friday, Contractor shall pave the day before or earlier as needed in the week.
 2. Contractor shall replace painted traffic markings in accordance with local specifications.

3.06 MAINTENANCE

- A. Maintain the temporary pavement in a manner satisfactory to the Engineer, free from depressions, potholes, and rough surface until its removal is required for the installation of permanent paving.
 - 1. Install additional material to maintain a satisfactory driving surface.
 - 2. If additional material is needed due to settling or constant use, Contractor shall replace or fill at no additional cost to the Owner.

END OF SECTION

SECTION 02510
ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt concrete paving; top course or base course.
- B. Driveways and parking areas.
- C. Road shoulders.
- D. Compaction.
- E. Tolerances.
- F. Field quality control.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 01039 – COORDINATION
- C. Section 01300 – SUBMITTALS
- D. Section 01400 – QUALITY CONTROL
- E. Section 02112 – PAVEMENT CUTTING
- F. Section 02223 – BACKFILLING
- G. Section 02228 – COMPACTION
- H. Section 02229 – PAVEMENT SUBGRADE
- I. Section 02231 – AGGREGATE BASE COURSE

1.03 REFERENCES

- A. MassDOT Standard Specifications for Highways and Bridges, as amended.
- B. Massachusetts Manual of Uniform Traffic Control Devices.

1.04 PERFORMANCE REQUIREMENTS

- A. Paving and repaving accomplished under this contract shall meet the finished grades, elevations and profiles shown on the Drawings.
 - 1. Where pavement replacement is being accomplished, match the sectional profiles of the existing pavement unless otherwise stated herein or shown on the Drawings.

- B. All thicknesses of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with the MassDOT Standard Specifications for Highways and Bridges, as amended to date and as they apply to the following:
 - 1. Materials and batch plant requirements.
 - 2. Construction procedures except as modified herein.
 - 3. Weather and seasonal limitations except as modified herein.
- B. Paving work shall be performed by a qualified paving contractor or subcontractor acceptable to the Owner and Engineer.
- C. Obtain asphalt concrete materials from same source throughout project.

1.07 ENVIRONMENTAL LIMITATIONS

- A. Weather and Seasonal Limitations – Asphalt concrete and bituminous surface treatments shall not be placed on wet surfaces or when it is raining or when conditions prevent the proper handling, compacting or finishing of the asphalt concrete or when the surface temperature is less than specified in the MassDOT Specifications and or when the surface temperature is less than specified in the following table:

TABLE 1
WEATHER AND SEASONAL LIMITS

NOMINAL COMPACTED LIFT THICKNESS	SURFACE TEMPERATURE MINIMUM (NOTE 1)	SEASONAL LIMITS
3" or greater	40°F	None
Greater than 1" but less than 3"	45°F	(Notes 2 & 3)
0.1" or less	50°F	(Notes 2 & 3)
Bituminous surface treatments (Note 3)	70°F or greater	(Note 4)

NOTES:

1. All temperatures shall be measured on the surfaces (lay glass thermometer on surface and read after temperature has stabilized) where the paving is to be placed and the controlling temperature shall be the average of three temperature readings taken at locations ±25 feet apart.
2. Top course shall be placed only during the period of May 1 to October 15. In addition, when top course is placed between September 15 and November 15, not less than two rollers shall be furnished and operated by the Contractor.
3. Surface treatments shall be placed during the period of May 1 up to and including the first Saturday after Labor Day.
4. The ambient temperature shall be not less than 50 degrees F in the shade and not more than 95 degrees F.

1.08 COORDINATION

- A. Coordinate field work under provision of Section 01010 including maintenance of traffic, access to private driveways, and emergency vehicle access.

1.09 SCHEDULING

- A. Schedule the paving operations such that all paving necessary to provide safe and adequate maintenance and protection of traffic or for protection of previously laid courses is completed within the weather and seasonal limitations.
 - 1. Such scheduling shall include expediting construction operations to permit paving before the seasonal limitations or by limiting the length of work to that which can be completed before the seasonal shut-down.
 - 2. The cost of scheduling and sequencing of work to conform with the seasonal limitations shall be reflected in the bid prices for the related contract items.

1.10 MAINTENANCE

- A. The Contractor shall maintain driving surfaces, free of ruts and potholes, for maintenance of traffic until temporary paving or permanent paving is installed.
 - 1. All temporary paving and pavement replacement shall be maintained in a safe, drivable condition until the pavement wearing course is installed.
 - 2. All subgrade, subbase and base courses shall also be maintained in their specific finish condition prior to placement of the next course.
- B. If the Contractor fails to complete the necessary paving operations prior to weather and seasonal limitations, all temporary materials and work which become necessary as a result of such failure, such as the lowering or shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate maintenance and protection of traffic until paving operations can be completed the following paving season, shall be at the Contractor's expense.
- C. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly patch, maintain, repair, and/or replace any pavement that settles or becomes damaged due to settlement or defective materials or workmanship.
 - 1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.
 - 2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.
 - 3. If more than top course depth of 1-1/2 inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.
 - 4. The centerline finished grade, in any case, shall be as shown on the Contract Drawings.

PART 2 PRODUCTS

2.01 ASPHALT CONCRETE

- A. Base Course – Materials shall be HMA Base Course as specified in the MassDOT Standard Specifications for Highways and Bridges latest edition as amended, Section M3.11.03.
- B. Binder Course - The pavement binder course shall be constructed of the following type and to the widths and depths as shown on the Drawings.
 - 1. The binder course shall be HMA Surface Course – Dense Binder in accordance with MassDOT Section M3.11.03.
- C. Pavement Wearing Course (Surface or Top Course) - Pavement wearing course shall be constructed of the following type and to the width and depth as shown on the Drawings.
 - 1. This wearing course shall be HMA Surface Course – Standard Top, in accordance with MassDOT Section M3.11.03.
- D. Traffic Markings - Contractor shall replace all markings in accordance with local, county, or state specifications (depending on jurisdiction). Temporary pavement markings shall be painted; final pavement markings shall be thermoplastic, unless otherwise noted on the Contract Drawings.

2.02 SOURCE QUALITY CONTROL

- A. Provide certification of state approved job mix formulas for types to be used on this project.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Permanent restoration of pavements shall not begin until after trench or structure backfill has been completed in accordance with the applicable specifications or until testing of the installed utility has been completed in accordance with the specifications (whichever is the longest period of time after completion of trench or structural backfill).
 - 1. Completion of backfill shall include compaction tests to ascertain compliance with degree of compaction required as described in Section 02228.
- B. If painted traffic markings on the pavement are to be interrupted by the new pavement replacement, they are to be restored using an approved traffic paint in accordance with MassDOT Standard Specifications.
- C. Driveway and Parking Areas
 - 1. Driveways and parking areas that are disturbed or damaged by the Contractor's operations shall be restored equal to a new condition.
 - 2. Driveway or parking area aprons which do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1 inch per foot with top course material of the new

pavement, so that the apron conforms to the elevation of the road pavement at each location.

3. New driveways or parking areas shall be constructed as described herein and as shown on the Drawings.
 4. Contractor shall completely replace driveway apron from trench to the road edge of pavement if trench is within 10 feet of road edge.
- D. Road shoulders to be constructed or reconstructed as described herein and as shown on the Drawings.
1. Road shoulders that are disturbed or damaged by the Contractor's operations shall be restored equal to, or to conditions superior to that which existed prior to construction.
 2. Road shoulders that do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1-1/2 inches per foot. Paving materials shall match existing unless otherwise shown on the Drawings.

3.02 PREPARATION

- A. Where project consists of reconstructing existing streets, lower valve boxes and existing manholes to subgrade level by removing frame and cover and brick masonry.
1. Cover valve boxes and manholes with steel plates and locate with measured ties.
 2. After constructing the subbases and pavement courses, and prior to placing the final top course, recover valve boxes and manholes, and raise to finished grade.
- B. All existing and new manholes, frames and covers, valve boxes, curb boxes, etc., shall be raised or lowered to be 1/2 inch below the new pavement grade.
1. No manhole covers or valve box covers shall be covered with paving material, or be exposed in a depression in the pavement greater than 1/2 inch.
- C. Catch basin frames and grates shall be raised or lowered to be 1 inch below the new pavement finished grade.
- D. Pavement Cuts
1. Pavement cuts shall be made parallel to the centerline of the trench, shall be located a minimum of 12 inches outside the backfilled trench on undisturbed subgrade and shall be in a straight line for minimum length of 100 feet between manholes or between those stations where changes in direction of the installed piping were made.
 2. Where a full street width overlay is to be installed the cutbacks may follow the backfilled trench alignment.
 3. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the Contractor's expense and match the proposed permanent paving.
 4. Pavement cuts in driveways shall be cut back 12 inches and made in a straight alignment perpendicular or parallel to the driveway and for its full width.

5. Pavement cuts in parking areas shall be cut back 12 inches and made in a straight alignment parallel to the centerline of trench.
- E. Preparation of Existing Surfaces
1. Prior to placing of asphalt concrete, the existing pavement surfaces shall be cleaned including brooming, mechanical sweeping, and flushing with water such that no dust or foreign material remains on the existing surface and in accordance with MassDOT Specifications.
 2. After cleaning of surface, all unsealed or inadequately sealed cracks and joints shall be cleaned with compressed air and then sealed as required under MassDOT Specifications.
 3. Prior to placing of asphalt concrete, vertical faces of existing pavement, structures, curbs and gutters shall receive a tack coat as described in MassDOT Standard Specifications.
- F. All new pavement where meeting existing pavement shall be butted up against a vertical face in the existing pavement.
1. This vertical face to be cut to the depth of the new pavement.
 2. Where the new pavement is an overlay, the beginning and end of the top course shall be similarly butted against a vertical face.
 3. The existing pavement shall be removed for a minimum length of 2 feet, as measured parallel to the direction of paving, or greater if required to eliminate any noticeable bump or to provide adequate drainage away from structures, and to the width of new pavement.

3.03 PREPARATION - RESET MANHOLE FRAMES

- A. Prior to placing wearing (top) course, make final adjustments of manhole frames, catch basin frames, valve boxes and any other utility structures located in the pavement in relation to finished grade.
1. Manhole frames, valve boxes, etc. to set 1/2 inch below finished grade and parallel to finished crown.
 2. Catch basin frames to set 1 inch below finished grade and parallel to finished crown.
 - a. Bevel slope of wearing course (for 6-inch width) around catch basin frame.

3.04 INSTALLATION

- A. Install Work in accordance with MassDOT standards.
- B. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact with vibratory pans and hand tamps in area inaccessible to rolling equipment.
- C. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.05 PLACING AND COMPACTING

- A. Placing mix in an appropriate ambient temperature and on a surface sufficiently warm to minimize the risk of excessive cooling before completion of rolling is of paramount importance. Holding the aggregate particles in place is solely the function of the film of asphalt. The asphalt cannot perform this function properly if the mix is too cool when rolled.
1. A thin course compresses very little under the roller and, as it cools quickly, it must be rolled as soon as possible.
 2. The Contractor shall supply sufficient number of rollers to perform the required compaction while asphalt concrete is still hot and in a workable condition and coordinate speed of paver with rollers such that the degree of compaction required is obtained.
 3. A high degree of densification is not the goal with this type of mix; the aim is firm seating and contact of the aggregate particles.
 4. One or two coverages (see Table 2) with a steel-wheeled roller weighing 8 to 10 tons is sufficient. Additional rolling may be excessive, causing a break in the bond of asphalt between aggregate particles, particularly after the mix has cooled.
 5. When overtaken by sudden storms, the Engineer may permit work to continue up to the amount which may be in transit from the plant at the time, provided the mixture is within temperature limits specified.
- B. Paving – Placement of the surface course shall be carefully planned to assure that the longitudinal joints in the surface course will correspond with the edges of the proposed traffic lanes. They shall not be located within the normal wheelpath of vehicular traffic.
1. When paving adjoining lanes, the asphalt concrete shall be laid such that it uniformly overlaps the adjacent lane 2 inches to 3 inches. The thickness of the overlap material shall be approximately 1/4 the compacted thickness of the course, so as to result in a smooth and well compacted joint after rolling. The overlapped material shall be broomed or raked back onto the adjacent hot lane so that the roller operator can crowd the small excess into the hot side of the joint. If the overlap is excessive, the excess material shall be trimmed off so that the material along the joint is uniform. The coarse particles of aggregate in the overlap material shall be removed and wasted if deemed necessary by the Engineer.
 2. Transverse joints shall be staggered a minimum of 10 feet from adjacent lanes.
- C. Compaction - Asphalt concrete shall be compacted in accordance with MassDOT Specification "460.64 Compaction".
- D. The required number of passes for either vibratory or static rollers, listed in Table 2, are minimum and may be increased by the Engineer. One pass shall be defined as one movement of the roller over any point of the pavement in either direction. Static roller passes shall continue until all ruts, ridges, roller marks or other irregularities are removed from the surface. The Engineer may alter the compaction procedures for small areas where the specified procedures are not practical.

TABLE 2
REQUIRED NUMBER OF PASSES (MINIMUM)

PAVEMENT COURSES	VIBRATORY ROLLER		STEEL-WHEEL TANDEM FINISH ROLLER
	VIBRATING PASSES (1)	STATIC PASSES (2)	STATIC PASSES
Base (Open graded each lift)	4	2	5
Base (Dense graded)	4	2	5
Binder (Dense graded)	4	Not required	5
Top (Dense graded all types)	2	Not required	2

NOTES:

1. The required number of vibrating passes shall be reduced by one-half (1/2) for dual vibrating drum rollers when the drums are tandem and are both in the vibrating mode.
 2. The required number of static passes may be completed by the vibratory roller operating in the static mode.
- E. Unless otherwise directed by the Engineer, vibratory rollers having pneumatic drive wheels shall compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two passes with the drum operating static. Unless otherwise directed by the Engineer, dual vibrating drum rollers shall compact the joint by overlapping the joints in two passes with both drums operating static.
- F. To prevent adhesion of the mixture to the drum(s), the drum(s) shall be kept properly moistened with water, or water mixed with small quantities of detergent or other Department approved materials. If required to prevent pneumatic tire pickup, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar material. In all instances, the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in pavings, compaction, or cleaning operations.
- G. If the Engineer determines that unsatisfactory compaction is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Contractor shall immediately cease using this equipment and proceed with the work in accordance with the conventional static compaction procedures at no additional cost.
- H. The Contractor should note that if he elects to use vibratory compaction equipment, he assumes full responsibility for the cost of repairing all damage that may occur to highway components and adjacent property or underground utilities.
- I. Testing will be done by a qualified, independent testing laboratory in accordance with this Section and Section 01400.
- J. The Contractor shall employ and pay for an independent testing laboratory to verify the number of passes required by the rollers to achieve maximum density at the start of paving of each asphalt concrete course. Acceptable testing methods include nuclear test methods.
- K. Areas inaccessible to rollers shall be compacted using vibratory pans, making a minimum of two passes on each course. Hand tamps shall be used for small areas not otherwise compacted.

- L. At the end of each work day, when placing top course material, the face of each paving lane shall be ended by the placing of a 2-inch x 4-inch or suitable sized board perpendicular to the pavement and shimmed with asphalt concrete to provide a driving surface such that the board and shim material can be easily removed and a vertical face retained for butting the start of the new pavement on the following work day.

3.06 DRIVEWAYS AND PARKING AREAS

- A. Paving materials, type of paving, depth of various courses, etc., shall be as shown on the Drawings.
 - 1. The driveways and parking areas shall be cut back 12 inches from outside disturbed or damaged areas as described above.
 - 2. The minimum depth of subbase shall be 12 inches of gravel per Section 02231 and Section M2.01.7 of the MassDOT Standard Specifications.
 - 3. The work shall include proper compaction of any necessary subbase, base course and paving courses, in accordance with Section 02228.
- B. Bituminous surfaces shall be restored with asphalt concrete matching existing, but in no case shall be less than 2 inches of binder and 1 inch of top course as specified in the applicable Articles of this Section.
- C. Non-Bituminous Surfaces - Where shown on the Drawings, construct new driveways and parking areas or restore existing driveways and parking areas as follows:
 - 1. Gravel surfaces shall be restored using screened gravel per Section 02231 of Specifications, matching existing, but in no case shall be less than 6 inches thick. The gravel shall be graded, shaped, and compacted. Loose stones shall be removed.
 - 2. Crushed stone surfaces shall be restored matching existing stone, but in no case shall be less than 1 inch thickness of stone. Stone to be compacted with a roller.

3.07 SEAL COAT

- A. Apply seal coat to surface course and asphalt curbs in accordance with MassDOT Standard Specifications.

3.08 TOLERANCES

- A. Surface Tolerance - The pavement surface shall be constructed to a 1/4-inch tolerance. If, in the opinion of the Engineer, the pavement surface is not being constructed or has not been constructed to this tolerance based upon visual observation or upon riding quality, he may test the surface with a 16-foot straight edge (furnished by the Contractor) or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement.
 - 1. Variations exceeding 1/4-inch shall be satisfactorily corrected or the pavement relayed at no additional cost as ordered by the Engineer.
- B. Thickness Tolerance - The thickness indicated for each of the various courses of bituminous pavement is the nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.

1. Material which is part of a trueing or leveling course or shim course will not be considered in pavement thickness determinations.
2. A tolerance not to exceed 1/4-inch from the nominal thickness required for the course specified under one pay item will be acceptable where the required nominal thickness is 4 inches or less. A tolerance not to exceed 1/2-inch from the nominal thickness required for the course or courses specified under one pay item will be acceptable where the required nominal thickness is over 4 inches. In addition, the sum total thickness of all bituminous mixture courses shall not vary from the total of the nominal thickness indicated on the plans by more than 1/4-inch where the total nominal thickness is 4 inches or less; or more than 1/2-inch where the total nominal thickness is over 4 inches but not more than 8 inches; and by not more than 5/8-inch where the total nominal thickness is more than 8 inches.

3.09 FIELD QUALITY CONTROL

- A. Contractor shall perform field inspection and testing under provisions of Section 01400 and as identified in this specification. Asphalt concrete samples shall be taken for each day of paving operations.
- B. The required degree of compaction for wearing or top courses is a finished product having not more than 7 percent air voids.

3.10 PROTECTION

- A. Any pavement, constructed or reconstructed, which is subsequently damaged due to activity of work under this contract, shall be removed and replaced by the Contractor at no additional cost to the Owner.
- B. Protect pavement from vehicular traffic until compaction is completed.

3.11 PAVEMENT MARKING

- A. Pavement marking shall be white and be in accordance with MassDOT Standard Specification 860 and M7.00, as amended.
- B. Raised pavement markers shall be in accordance with MassDOT Standard Detail TR.6.2. Manufacturer of markers shall be identified on MassDOT's list of qualified construction materials.

END OF SECTION

SECTION 02576
PAVEMENT PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous Pavement Patching.
- B. Concrete Pavement Patching.
- C. Compaction.
- D. Testing.

1.02 RELATED SECTIONS

- A. Section 01026 – LUMP SUM ITEMS
- B. Section 02112 – PAVEMENT CUTTING
- C. Section 02228 – COMPACTION
- D. Section 02229 – PAVEMENT SUBGRADE
- E. Section 02231 – AGGREGATE BASE COURSE
- F. Section 02510 – ASPHALT CONCRETE PAVING

1.03 REFERENCES

- A. MassDOT - Standard Specifications for Highways and Bridges, as amended.

1.04 SUBMITTALS

- A. None.

1.05 PROJECT RECORDS

- A. None.

1.06 ENVIRONMENTAL LIMITATIONS

- A. Patching to be done only when temperature and weather meet the requirements as described in Sections 02510.

1.07 SCHEDULING

- A. Schedule patching work in coordination with local authorities having jurisdiction over the site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to Section 02229 aggregate base course for description of screened gravel or crushed stone for base course.
- B. Refer to Section 02510 for description of bituminous material for patching.
 - 1. Patches up to 2 inches deep install wearing course asphalt concrete.
 - 2. Patches over 2 inches deep use a combination of courses of base, binder and wearing course as approved by the Engineer.
- C. Provide asphalt emulsion for tack coating of existing edges of patch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. All bituminous pavement patching shall be done with asphalt concrete material matching existing pavement.
- B. All concrete pavement patching to match existing jointing system.
 - 1. Concrete patch will be the same thickness as existing concrete pavement, but not less than 8 inches.

3.02 PREPARATION

- A. Prior to all patching, the affected area shall be cut out as per Section 02112 in a rectangular or square shaped manner.
 - 1. Cutting and removal of existing material to extend 12 inches outside the affected area.
 - 2. Two sides of the area shall be at right angles to the direction of traffic.
 - 3. At no time will the temporary patch be removed by a machine with bucket teeth so as not to destabilize the base material.
 - 4. All material within the cut-out area to be removed down to a firm subgrade and disposed off-site as surplus material.
 - 5. The surface area to be cleaned of all partially weathered or disturbed material and compacted to provide a clean hard foundation and clean interface between patch and existing pavement.

3.03 INSTALLATION

- A. Subbase shall be brought to grade with screened gravel per Section 02223 as specified for base material.
 - 1. For bituminous patching a tack coat shall be applied to the vertical faces of the existing pavement prior to placing asphalt material. Refer to Section 02510.
 - 2. For concrete patching the vertical faces of concrete to be moistened and a thin coating of grout applied.
- B. A bituminous (asphalt concrete) patch shall then be applied to a depth equal to the original bituminous material, but not less than two courses of 1-1/2 inches each (material to be placed against the edges of the hole first).
 - 1. Avoid pulling material from center of patch to the edges, instead if more material is needed at the edge, it should be deposited there, and the excess raked away.
 - 2. Sufficient material should be used to ensure that after compaction, the patched surface will be at the correct grade and slope, slightly higher than the adjacent pavement, and not below the adjacent pavement.
 - 3. Each course shall be thoroughly compacted by the use of mechanical tampers, vibratory plate compactors and hand tampers for small areas and roller for large areas.

3.04 TOLERANCES

- A. After completion of patching, the Contractor shall check smoothness with straight edge or stringline. Deviations of 1/8-inch or more shall be corrected.

END OF SECTION

SECTION 02662

UNDERGROUND AND OUTSIDE VALVES AND HYDRANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing the several types of valves, stops, and backflow preventers.
- B. Hydrants.
- C. Valve operators.
- D. Valve boxes.
- E. Installation.

1.02 RELATED SECTIONS

- A. Section 01039 – COORDINATION
- B. Section 01300 – SUBMITTALS
- C. Section 01500 – TEMPORARY FACILITIES
- D. Section 01700 – RECORD DOCUMENTS

1.03 REFERENCES

ANSI/AWWA C500	Gate Valves for Water and Sewerage Systems
ANSI/AWWA C502	Dry Barrel Fire Hydrants
ANSI/AWWA C504	Rubber Seated Butterfly
ANSI/AWWA C506	Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types
ANSI/AWWA C507	Ball Valves 6 inches through 48 inches
ANSI/AWWA C508	Swing Check Valves for Waterworks Service 2 inches through 24 inches NPS
ANSI/AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
ANSI/AWWA C540	Power-Activating Device for Valves and Sluice Gates
ANSI/AWWA C550	Protective Interior Coatings for Valves and Hydrants
ASTM A126	Gray Iron Castings
ASTM A48	Gray Iron Castings for Valves, Flanges and Pipe Fittings

1.04 DESIGN REQUIREMENTS

- A. The design working pressure shall be 200 psig for valves 12 inches NPS in diameter and smaller.

- B. The design working pressure shall be 150 psig for valves 16 inches NPS in diameter and larger.
- C. Valves shall be designed for normal cold water use.
- D. Gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.
- E. Resilient seated gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.
- F. Hydrants shall be designed for a 300 psig test pressure and 150 psig working pressure.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit shop drawings of types of valves, hydrants and appurtenances proposed for the project including conformance to ANSI/AWWA codes and related details for field assembly, operations, and maintenance.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install Products specified.
- D. Results of shop tests, if required.
- E. Manufacturer's Certificate - Certify that products meet or exceed specified requirements.
- F. Certification of UV inhibitors in plastic (PVC, HDPE, etc.) piping for piping that will be outdoors and aboveground or inside process tanks.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Record location of valves and hydrants with a minimum of two ties to permanent objects.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this Section.
- B. All sheeting and bracing including the use of mobile shields shall conform to Occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations.
- C. Conform to requirements of permits obtained by the Contractor.

1.08 FIELD MEASUREMENTS

- A. Verify by field measurements and exploratory excavations that existing pipe outside diameter (for tapping sleeve and valve installations) and facilities locations and elevations are as indicated and/or as shown on drawings. Notify Engineer of specific differences.

1.09 COORDINATION

- A. Coordinate work under provisions of Sections 01039 and 01500.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Valve size, type of valve, joint type, class, lining, coatings shall be installed as listed herein or as shown on Drawings.
- B. Valves shall be of standard manufacturer and of highest quality, both as to material and workmanship, conforming to the latest edition of AWWA standards specified.
- C. All valves and hydrants shall have the manufacturer's name monogrammed or initialed by the manufacturer thereon and shall be identified by catalog numbers.
- D. All valves shall be provided with hub, spigot, mechanical joint, flange or screwed ends as described herein.
- E. Valves, 2 inches in nominal diameter and smaller shall be all brass or bronze.
- F. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted.
- G. All surface forming joints or bearing surfaces shall be machined to a perfect fit.
- H. All disc and seat rings shall be carefully and thoroughly secured in place with the iron castings machined where the rings are bare and the backs of the rings machined all over.
- I. After the rings have been fastened securely in place, the front shall be machined all over to a perfectly true and smooth bearing surface.
- J. All valves with non-rising stems shall have valve position indicators.
- K. Valves shall open counterclockwise (left) unless otherwise specified.

2.02 BURIED GATE VALVES

- A. Buried gate valves shall be resilient seated, non-rising stems, 2-inch operating nuts, O-ring seal and shall open counterclockwise (left).
 - 1. Underground gate valves shall be of the iron body, bronze mounted type conforming to AWWA Standard C500.
 - 2. Mechanical joint type designed for underground use at 150 psi.
 - 3. Underground gate valves shall be Mueller, Kennedy Valve Manufacturing Company, J&S Valves, or equal.

2.03 VALVE BOXES

- A. Valve boxes shall be provided for all buried valves.
- B. Valve boxes shall be made of good quality cast iron and shall be of the sectional adjustable type. The long section shall be a minimum of 5 inches in inside diameter and fit around the stuffing box of the valve; or over the valve operator, if a two-section box is used; or to fit a circular or oval-base section if a three-section box is used.

- C. The upper section shall be arranged to screw on over the adjoining long section and shall also be full diameter. Screw-type valve boxes shall be used unless otherwise specified. Valve boxes shall be provided with cast iron lids or covers.
- D. Lids or covers shall be marked "Sewer". An arrow shall be provided on the cover to indicate the direction in which the valve is turned to open; this arrow shall be labeled with the word "OPEN".
- E. The overall length of each valve box shall be sufficient to permit the top of the box to be set flush with the established finished grade. Asphalt concrete to be compacted 12 inches wide around the upper section for a depth of 12 inches below finished grade.
- F. Valve boxes shall be set truly vertical and fully supported until sufficient backfill has been placed and compacted to ensure vertical alignment of the box.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut, excavated base and valve bedding is ready to receive work and valve bedding dimensions and elevations are as indicated on drawings.
- B. All valves, hydrants, stops, and appurtenances shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged joints, including damaged linings or coatings, or otherwise defective valves, hydrants, and stops, as determined by the Engineer, shall be culled out and not installed. Such rejected material shall be clearly tagged in such manner as not to deface or damage it, and the material shall then be removed from the job site by the Contractor at his own expense.
- C. For tapping sleeve and valve connections, the Contractor, prior to making any connections, shall verify the material and outside diameter of the existing water main.
- D. The Contractor shall have on the job site all the proper tools, gauges, pipe cutters, lubricants, etc., to properly install valves, hydrants, etc.

3.02 PREPARATION

- A. Prior to installing the foundation, trenches shall have all water moved and all work performed in a dry stable trench.
- B. All valves, hydrants, etc. which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the various types as shown on the Contract Drawings.
- C. Bedding material shall be spread in maximum of 8-inch layers for the pipe foundation and each layer shall be compacted until the required total depth of bedding has been built up.
- D. Suitable holes or depressions shall be provided in the bedding to permit adequate bedding of bells, couplings or similar joint projections.
- E. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing, as well as mechanical compactors.

- F. The Contractor shall perform his bedding operations with care to maintain line grade and proper depth of valve and hydrants.

3.03 LINES AND GRADES

- A. Easement and property line and other control lines necessary for locating the work are shown on the Drawings.

3.04 TOLERANCES

- A. Valves and hydrants shall be laid to the lines and grades shown on the Drawings.

3.05 INSTALLATION

- A. The Contractor shall furnish slings, straps, and/or approved devices to provide satisfactory support of the valves or hydrants when lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damaged to the coating or lining or castings.
- B. The valves or hydrants shall not be dropped from trucks onto the ground or into the trench.
- C. All valves shall be installed in accordance with the specifications for the pipe to which they are to be connected and as previously described for individual types of valves.
- D. Joints of valves shall be made up in accordance with the Contract Drawings and/or as described under the appropriate pipe joint descriptions found in other sections of these specifications.
- E. The valves shall be so located that they are accessible for operating purposes and shall bear no stresses due to loads from the adjacent pipe.
- F. All valves shall be inspected before installation, and they shall be cleaned and well lubricated before being installed in the line.
- G. Hydrants shall be set at locations specified on the Contract Drawings and shall be of such length that, with the frost ring at the ground surface grade, there shall be 5 feet of cover over the connecting pipe.
- H. Hydrants shall be set so that the barrel is truly vertical, and shall be properly backfilled so that the barrel will remain truly vertical.
- I. They shall be placed with 3 cubic feet of crushed stone pocket to provide drainage for the hydrant.

3.06 PRESSURE AND LEAKAGE TEST

- A. All installed valves, hydrants and appurtenances shall be subjected to the pressure and leakage test as described under Section 02741 as applicable.

END OF SECTION

SECTION 02698
UNDERGROUND PROCESS PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Underground process pressure piping, fittings and specials located outside structures.
- B. Miscellaneous appurtenances.
- C. Shop tests.
- D. Installation.
- E. Testing.
- F. Pipe schedule.

1.02 RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 – SUBMITTALS
- C. Section 01500 - TEMPORARY FACILITIES
- D. Section 01700 - RECORD DOCUMENTS
- E. Section 02205 - PROTECTION OF EXISTING FACILITIES
- F. Section 02222 – EXCAVATING
- G. Section 02223 - BACKFILLING
- H. Section 02228 – COMPACTION
- I. Section 02662 - UNDERGROUND AND OUTSIDE VALVES AND HYDRANTS
- J. Section 02739 - PRESSURE TESTS OF WATER, DRAIN AND PROCESS PIPING

1.03 REFERENCES

American National Standards Institute (ANSI).
American Water Works Association (AWWA).
American Society for Testing Materials (ASTM).

A. Ductile Iron and Gray Iron Pipe

ANSI A21.4/AWWA C104	Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water
ANSI A21.4/AWWA C105	Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
ANSI A21.10/AWWA C110	Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
ANSI A21.11/AWWA C111	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
ANSI A21.50/AWWA C150	Thickness Design of Ductile Iron Pipes
ANSI A21.51/AWWA C151	Ductile Iron Pipe Centrifugally Cast in Metal Molds and Sand Lined Molds for Water and Other Liquids
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances
ASTM A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data - Provide data, indicating conformance to ASTM/AWWA codes, pipe material, sizes, class, dimension, joint type and accessories.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Results of Shop Tests, if required.
- E. Manufacturer's Certification - Certify that products meet or exceed specified requirements.
- F. Chemical compatibility with pipe, gaskets, solvent welding cements and other parts of the piping system. This submittal is required for all chemical feed systems.
- G. Submit applicable warranties.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Submit marked up record plans including record location of pipe connections, valves, cleanouts, bends, tees, manholes, and rim and invert elevations. Invert elevations to be of the pipe invert at a point where the pipe enters or exits a structure.
- C. Identify and locate on record drawings during construction the discovery of exposed uncharted existing utilities and services.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of permits obtained by Owner and attached to these specifications.
- B. Conform to the requirements of regulatory agencies having jurisdiction over the Work.

1.07 FIELD MEASUREMENTS

- A. Prior to start of construction, verify the field measurements and elevations that existing conditions, elevations, and structures are as shown on Drawings. Notify Engineer of specific differences.
- B. Prior to start of construction, where ordered, verify by exploratory excavations that existing underground utility locations and elevations are as shown on drawings prior to installation of crossing pipes or to confirm location and elevation of uncharted utilities. Notify Engineer of location and elevation and allow Engineer sufficient time to determine any changes required as a result of such exploratory excavation, prior to start of construction.

1.08 COORDINATION

- A. Coordinate work under provisions of Sections 01039 and 01500, including field engineering, maintenance of traffic and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal), including the organization identified in Section 02205 for location of existing utilities and protection thereof.
- C. Coordinate the work with local owners where effecting operation of existing structures, pumping stations and treatment facilities.

PART 2 PRODUCTS

2.01 GENERAL

- A. All products included in this section shall conform to the requirements of the standard specifications referenced herein.
- B. Pipe material, pipe class and pipe sizes shall be furnished and installed as listed in the pipe schedule or as shown on the Drawings.
- C. All pipes and fittings shall be restrained push-on joint ductile iron unless otherwise listed in pipe schedule, except as follows:
 - 1. Potable and non-potable water pipe 3 inches or less in diameter shall be copper.
- D. The underground process piping system shall be installed as shown on the Drawings.

2.02 MATERIALS

- A. 20" Ductile Iron Pipe (DIP)
 - 1. DIP shall be restrained joint pipe conforming to ANSI/AWWA C151/ANSI A21.51.
 - 2. DIP materials shall be Pressure Class 350.
 - 3. Fittings shall conform to ANSI/AWWA C153/A21.53 and ASTM A536.
 - 4. Joints - Fittings and pipe shall be furnished with restrained push-on joints conforming to ANSI/AWWA C111/A21.11.

- a. Joints shall combine a continuous rubber gasket, beveled ductile iron welded-on retainer rings, and split ring ductile iron locking segments to provide a means of restraining the pipe against thrust due to internal water working pressure or external forces.
- b. Ductile iron locking segments shall be inserted through a slot in the bell face to provide a positive axial lock between bell interior surface and the retainer weldment on the spigot end of the pipe.
- c. As an alternative, for field cut pipe or other applications, a split ductile iron or steel locking ring with twin stainless steel bolts may be used in place of the ductile iron locking segments in restrained joint pipe.
- d. Joints shall permit the following maximum pipe deflection:

PIPE SIZE	MAXIMUM DEFLECTION (DEGREES)
4" through 12"	5.0
14" through 18"	3.0
20" through 36"	1.5
42" through 54"	0.5

- 5. Restrained joint pipe shall be TR Flex as manufactured by U.S. Pipe or equal. Tyton Joint by U.S. Pipe will be considered equal to the TR Flex system for this project.
 - a. Split locking rings (when required) shall be utilized for restraint of 4" through 36" field cut pipe without pipe welding.
 - i. Restrained joint fittings and the restraining components shall be ductile iron in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions.
 - ii. Joints are suitable for 350 psi working pressure for sizes 4" through 24" and 250 psi working pressure for sizes 30" through 36".
 - iii. Ring consists of ductile iron locking segments, which have stainless steel teeth mounted on the I.D. surface. This replaces the locking segments normally found at the bell and spigot ends of the pipe, which have a weldment to provide a positive axial lock between the bell interior surface and the spigot exterior surface.
- 6. All pipe and fittings used for process piping shall be lined and coated as specified in Article 2.04.
- 7. All fittings, valves and appurtenances shall be furnished with ductile iron retainer glands which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases.
- 8. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of the latest revision. Twist off nuts shall be used to insure proper actuating of the restraining devices.

9. The mechanical joint restraint device shall have a working pressure of at least 240 psi with a minimum safety factor of 2:1 and shall be manufactured by the following:
 1. EBAA Iron, Inc.
 2. Or equal.

- B. Under 20" Ductile Iron Pipe (DIP)
 1. Pipe material, sizes, classes, etc. shall be furnished and installed as listed herein and as shown on the drawings.
 2. For potable/non-potable water applications, all linings and sealers shall conform to all applicable local, State and Federal health codes.
 3. Pipe shall be ANSI A21.51/AWWA C151 - Ductile Iron Pipe Material, thickness design conforming to ANSI A21.50/AWWA C150, Class 52, rubber gasket push-on joint and fittings with mechanical joint conforming to ANSI 21.11/AWWA C111 and ANSI A21.10/AWWA C110.
 4. Ductile iron pipe shall have cement mortar linings for potable water which shall conform to ANSI A21.4/AWWA C104 as follows:
 - a. Double Thickness - Linings shall consist of cement mortar, centrifugally applied, and shall not be less than 1/8-inch for 3 inches to 12 inches inclusive, 3/16-inch or 14 inches to 24 inches inclusive, and 1/4-inch for 30 inches to 54 inches inclusive. The inside shall be given a seal coat of asphalt material as described in ANSI A21.4/AWWA C104.
 5. Protective coatings for ductile iron pipes shall be an asphaltic coating approximately 1 mil thick and conform to requirements of ANSI 21.51/AWWA C151.
 6. All pipe fittings shall be furnished with ductile iron joint restraints (at every joint) which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Restraints shall meet same pressure class as pipe and conform to ANSI/AWWA C111/A21.11. Restraint shall be manufactured by U.S. Pipe or equal.
 7. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of the latest revision. Twist off nuts shall be used to insure proper actuating of the restraining devices.
 8. The mechanical joint restraint device shall have a working pressure of at least 240 psi with a minimum safety factor of 2:1 and shall be manufactured by the following:
 - a. EBAA Iron, Inc.
 - b. Or equal.

- c. Push-on joints shall provide the following maximum deflections:

PIPE SIZE	MAXIMUM DEFLECTION
4" through 12"	3°
16" through 18"	3°
24" through 36"	1.5°

9. Manufacturers shall be:
- a. American Pipe Product.
 - b. U.S. Pipe Product.
 - c. McWane Group (Clow or Atlantic States).
 - d. Or equal.

2.03 PIPE ACCESSORIES

- A. Fittings - Same materials, class, coatings and linings as pipe unless under Article 2.02 it was specifically described otherwise. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters, and other configurations.
- B. Hangers and supports shall have stainless steel support rods, stainless steel mounting hardware, fasteners and beam clamps.
- C. Pipe openings in walls shall be precast or core drilled and completely sealed against water seepage with a mechanical type seal consisting of interlocking synthetic rubber links and bolts with pressure plates wider at ends.
 1. Rubber Links - Shall be shaped to continuously fill the annular space between the pipe and the wall opening. The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM. Coloration shall be throughout elastomer for positive field inspection.
 - a. Temperature Range - -40 to 210 degrees F.
 - b. EPDM - ASTM D2000 M3 BA510.
 - c. Color - Black.
 2. Bolts - Bolts shall be of 316 stainless steel.
 3. Pressure Plates
 - a. Pressure plates shall be molded of glass reinforced nylon.
 - b. Shall include an integrally molded compression assist boss on the top (bolt entry side) of the pressure plate, which permits increased compressive loading of the rubber sealing element.

2.04 LININGS AND COATINGS

- A. Inside of Pipe
 - 1. Ductile Iron
 - a. All pipes and fittings shall have a double cement lining and an asphaltic lining in accordance with AWWA C104.
- B. Outside of Pipe
 - 1. Underground Pipe
 - a. Ductile Iron Pipe - All underground and concrete-encased ductile iron pipe and fittings shall be asphalt coated in accordance with AWWA C104.
 - 2. Non-Submerged Exterior Pipe - All non-submerged exterior ductile iron and steel pipe fittings shall be factory primed and field coated as indicated on the Drawings.

2.05 IDENTIFICATION

- A. Each pipe length and fitting shall be clearly marked with:
 - 1. Manufacturer's name and trademark.
 - 2. Nominal pipe size and class.
 - 3. Material designation.

2.06 ENCASEMENT

- A. When indicated on the drawings, buried process piping below structures or roadways shall be encased in concrete per detail on Drawings. All piping less than 36 inches below any paved roadway shall be encased. When the top of the encasing is within 12 inches of the bottom of the slab, the encasement shall be tied into the base slab with reinforcing. Concrete shall have minimum 28 day compressive strength of 3000 psi.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on Drawings.
- B. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work.
 - 1. Any pipe or fitting which the Engineer suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the Specifications.
 - 2. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including

damaged pipe lining or coatings or specials, as determined by the Engineer, shall be culled out and not installed.

- a. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense.

3.02 PREPARATION

- A. The Contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. to handle, cut and join the pipe.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in and uniformly supported on pipe foundations of the type shown on the Drawings. In particular, stones 2 inches and larger shall be removed from the bearing surface of the pipe foundations.
- E. Pipe foundation bedding material shall be spread in maximum 8-inch layers and each layer shall be compacted up to the spring line of the pipe.
- F. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing as well as mechanical compactors.
- G. The Contractor shall perform his bedding operations with care to maintain line and grades.
- H. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03 LINES AND GRADES

- A. The Contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The Contractor shall have personnel on duty or on standby call, at all times, who are qualified to check line and grade of pipe lines as they are installed.
- B. During construction, the Contractor shall provide the Engineer, at this request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two rodmen or chainmen as needed at intermittent times.
- C. The Contractor shall carefully preserve bench marks, reference points and stakes established by the Engineer or Owner, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to reestablish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.
- D. The Contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.
- E. The use of string levels, hand levels, carpenter's levels or other relatively crude devices for transferring grade or setting pipe are not to be permitted.

3.04 TOLERANCES

- A. Pipes shall be laid to the lines and grades shown on the Drawings.
- B. Minimum depth of cover shall be maintained as shown on the Drawings or as described herein.
- C. Invert elevations at any location shall not vary from the design elevations by more than 0.05 feet, unless a change in invert elevation has been ordered by the Engineer, in which case the same tolerance shall apply.
- D. Any sewer grade or invert elevation which exceeds these tolerances shall be corrected by the Contractor at his own expense unless accepted by the Owner as part of a defective work settlement.

3.05 INSTALLATION

- A. Installation of ductile iron pipe or plastic pipe to be in conformance with AWWA C600 or ASTM D2774, respectively, except as modified in this Section or referenced Sections or as shown on the Drawings.
- B. The Contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damage to the pipe or lining or castings.
- C. The pipe shall not be dropped from trucks onto the ground or into the trench.
- D. Each pipe section shall be placed into position in the trench on the pipe bedding in such manner and by such means required to cause no injury to the pipe, persons or to any property.
- E. The method of laying and jointing the pipe shall be in accordance with the recommendations of the manufacturer. Each pipe shall be aligned with that already in place, forced home completely with horizontal axial movement and held securely in position. The bell of each pipe length to be laid in the same direction the installation is proceeding.
- F. At the joints, enough depth and width shall be provided to permit the pipe layer to reach entirely around the pipe so that the joints may be made in accordance with the manufacturer's recommendations. Mechanical type joints shall be tightened within the AWWA recommended torque range.
- G. Pipes, fittings, and specials shall be firmly bedded in the pipe foundation and shall have full bearing throughout their entire length, which shall be accomplished by combination of shaping the bedding and adequately compacting the pipe bedding and backfill under and around the pipe to the spring line of the pipe. The remaining backfill placed in 12-inch lifts to 1-foot above the crown of the pipe in accordance with Table 1, Minimum Compaction Requirements, Section 02228. The remaining backfill installed in accordance with Section 02228.
- H. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.
- I. Unless otherwise shown on the Drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 4 feet.

- J. To deflect a pipe joint, first join the pipe in the proper manner and deflect the pipe within the allowable deflection recommended by the manufacturer.
- K. For each pipe entering or leaving a manhole or underground structure, at least one pipe joint shall be located within 4 feet of the outside face of the wall, and preferably at the 2-foot point.

3.06 COUPLINGS

- A. Couplings to be ASTM A536 ductile iron fittings with stainless steel bolts and nuts. The couplings shall receive two coats of coal tar epoxy paint on all exterior surfaces prior to installation. Nitrile (Buna-B) gaskets shall be provided with nominal temperature range from - 40 to 180 degrees F. Gaskets shall be compounded to produce storage while resisting water, acids, alkalies, most (aliphatic) hydrocarbons, and other chemicals
- B. Provide transition couplings to connect unlike materials as required by the documents or as approved by Engineer.

3.07 TEMPORARY PLUGGING

- A. At all times when pipe laying is not actually in progress, the open ends of the pipes shall be closed temporarily with pipe plugs or by other means such that there is no possibility of any water or foreign material entering the line. If water is in the trench when work is resumed, the plugs shall not be removed until the water has been removed and work can proceed in a dry stable trench.

3.08 CLEANING PIPELINE

- A. At the conclusion of the work, the Contractor shall thoroughly clean all new pipes by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered during the construction period.
 - 1. If, after this cleaning, any obstructions remain, they shall be corrected to the satisfaction of the Engineer. Pipes shall be flushed at a minimum rate of 2.5 feet per second for a suitable duration.
- B. Where required the Contractor shall use mechanical methods to clean pipes when flushing does not remove all obstructions or material.

3.09 TESTING

- A. Testing of the process piping or pressure pipelines shall be performed in accordance with Section 02739, and in accordance with the following table.

PIPE NO.	IDENTITY	PREDOMINANT SIZE	TYPE OF PIPE	SCHEDULE OR CLASS	JOINTS	TESTING PROCEDURE TYPE
1	Yard Piping	20"	DIP	350	Restrained push-on	A
2	Water Piping	6"	DIP	350	Restrained push-on	B

Notes:

- 1. Testing procedures refer to those listed in Section 02739 unless otherwise noted.
- 2. "Predominant Size" reflects the minimum inside diameter of the pipe.

- B. Any section of pipe that fails the pressure or leakage test shall be dug up and replaced or permanently repaired as approved by the Engineer. The replaced or repaired section shall be retested.

3.10 ENCASEMENT

- A. Where shown on the Drawings, pipes shall be encased in 2500 psi concrete. Details and requirements for encasement of pipes are shown on the Drawings.

3.11 VALVES AND HYDRANTS

- A. Refer to Drawings for locations of valves and hydrants to be installed on this project.

END OF SECTION

SECTION 02739

PRESSURE TESTS OF WATER, DRAIN AND PROCESS PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure testing of water, drain and process piping.
- B. Test requirements.
- C. Required replacement or repair if test fails.
- D. Project records.

1.02 RELATED SECTIONS

- A. Section 02698 - UNDERGROUND PROCESS PIPING

1.03 REFERENCES

- A. AWWA C-600 - Installation of Ductile Iron Water Mains and Their Appurtenances.

1.04 TEST REQUIREMENTS

- A. All piping systems shall be tested in accordance with AWWA Standard C-600 unless specified otherwise in the Piping Schedules. One of the following procedures shall be used, as required by the Pipe Schedule:
 - 1. Procedure A shall consist of a 15-minute test at 100 psi followed by a 3-hour test at 50 psi.
 - 2. Procedure B shall consist of a one-hour test at 150 psi followed by a two-hour test at 100 psi.
 - 3. Procedure C shall consist of a 30-minute test at 50 psi.
 - 4. Procedure D shall consist of an exfiltration test; the pipe is filled with clear water to provide a head of at least 5 feet above the top of the pipe at the highest point of the pipeline under test, and then measuring the loss of water from the line by the amount which must be added to maintain the original level. In this test, the test period (for taking measurements) shall not be less than three hours.
 - 5. Procedure E shall consist of a pressure test using air only. All piping shall be tested at a pressure of at least 1.5 times the working pressure for a period of not less than two hours.
 - 6. Procedure F - In the case of double walled piping systems, the secondary containment pipe shall be hydrostatically tested to not less than 10 psi at the highest point of the system or to the greatest permissible pressure recommended by the manufacturer of the double walled piping system, whichever is less. This test shall be maintained for a sufficient time to soap and complete visual inspection of all joints and connections, but for at least six hours. No loss in pressure will be allowed. The

Contractor is advised that there are pneumatic pressure test limitations on non-metallic piping systems. Consult piping manufacturer prior to testing.

7. Procedure G - Shall consist of a two-hour test at a pressure of 50 percent in excess of the maximum working pressure in the section being tested.
- B. When no test method for piping is specified in the Pipe Schedule in Section 02698, the following procedure shall be used.
1. All newly laid pipe or any valves section thereof, shall be subjected to a hydrostatic pressure 50 percent in excess of the working pressure at any point of tested, but in no case less than 50 psi in any section of the pipe being tested, for a period of two hours.
- C. A leakage test shall be conducted concurrently with the pressure test. The section tested shall be driptight with no signs of leakage. All piping, equipment, etc., shall be dry before and after testing.
- D. Leakage Test
1. All leakage tests shall be conducted concurrently with the pressure test.
 2. Leakage defined - Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure throughout the duration of the test after the pipe has been filled with water to the test pressure.
 3. The rate of leakage shall not exceed 11.65 gallons per day, per mile of pipe, per inch of nominal pipe diameter based on a test pressure of 150 psi. To calculate allowable leakage in gallons per hour (gph) for other test pressures, refer to Table 6 of AWWA C600. A copy of which is at the end of this Section, including the basic formula for calculating leakage.
- E. Test pressure shall not exceed pipe or thrust restraint design pressures.
- F. Test pressure shall not exceed twice the rated pressure of the valves when the pressure boundary of the test section includes closed gate valves.

1.05 SUBMITTALS

- A. For each test, submit completed GHD Form No. 31.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Contractor to complete and submit for each test the GHD Form No. 31 for recording data for flushing and testing pressure pipe (see form at end of this section).

1.07 REGULATORY REQUIREMENTS

- A. Submit proof of testing as required by local, County or State agencies and this Section of the Specifications.

1.08 FIELD MEASUREMENTS

- A. Measure length of test section.
- B. Measure quantity of water used to maintain test pressure during test period.
- C. Measurements required to complete GHD Form No. 31.

1.09 COORDINATION

- A. Provide 48-hour notice to local water department (Owner) when water for flushing and testing is required.
- B. Owner of existing water system to operate all valves and hydrants unless Contractor has been authorized by Owner to operate water systems valves and hydrants.

PART 2 PRODUCTS

2.01 WATER SUPPLY

- A. See Section 01010.

PART 3 EXECUTION

3.01 PREPARATION

- A. The Contractor shall supply all plugs, pumps, weirs, gauges, etc., necessary to conduct the tests, including means to accurately measure the quantity of water used to maintain test pressure during the test period.
- B. Flush all piping systems with water prior to testing.

3.02 TESTING

- A. Pressure and leakage tests shall be conducted on all gravity and pressure pipe prior to backfilling.
- B. The Engineer shall witness all tests.
- C. All test results shall be recorded on GHD Form No. 31 supplied by the Engineer.
- D. Pressurization - Each valved section of pipe shall be slowly filled with water. The specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe.
- E. Air Removal - Before applying the specified test pressure, air shall be expelled completely from the pipe and valves.
- F. Examination - Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, or valves that are discovered

following the pressure test shall be repaired or replaced with sound material and the test shall be repeated.

- G. All visible leaks, regardless of the amount, shall be repaired.
- H. If the section being tested fails to pass the pressure or leakage test, the Contractor shall determine, at his own expense, the source or sources of leakage, and he shall permanently repair or replace all defective materials and/or workmanship. The extent and type of repair as well as results, shall be subject to the approval of the Engineer. The completed pipe installation shall then be retested and required to meet the pressure and leakage requirements of this test.
- I. Testing and retesting shall be completed prior to final paving.
- J. The use of sealants, applied from outside or inside of pipe, is not acceptable.
- K. Disconnect all pumps, connections, and hoses from section being tested for duration of test.
- L. All tests shall be blown off at opposite end of pipe where pressure gauge is located or as directed by Engineer.
- M. Pressure gauges shall read in 1 psi increments for high pressure and 0.5 psi increments for low pressure tests.
- N. Pumps or devices for makeup water to calculate leakage shall be provided with calibration containers.

(continued)

**FLUSHING AND TESTING OF FORCE MAINS
TABULATION SHEET**

Job No. _____ Location _____
 Contract No. _____ Contractor _____
 Project _____
 Contractor's Representative _____ Observed by _____

FLUSHING

Date _____ Weather _____ Temperature _____
 Section Flushed _____ ft. of _____-inch diameter pipe
 Line Flushed _____ hrs. _____ min. @ _____ gal/min.
 Line Flushed Through _____ Manhole # _____

PRESSURE AND LEAKAGE TESTING

Date _____ Weather _____ Temperature _____
 Section Tested _____
 _____ ft. of _____-inch diameter pipe in _____-ft. laying lengths
 Time Started _____ Time Finished _____ Elapsed Time _____
 Test Pressure: Start _____ psi Finish _____ psi
 Water to Make up Initial Pressure _____ gallons
 Allowable leakage, as calculated _____ gallons
 _____ gallons (allowable leakage from AWWA C600 or Technical Provisions Section _____)

Pass _____ Fail _____

$$L = \frac{SD\sqrt{P}}{133,200^*}$$

- L = Allowable leakage in gallons/hour
- S = Length of pipe tested (linear feet)
- D = Nominal diameter of pipe (inches)
- P = Average pressure during test, psi

*Refer to C600 for additional allowance leakage against closed metal-seated valves.

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
- E. Section 02510 – ASPHALT CONCRETE PAVING

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. All cast-in-place concrete structures.
- B. Equipment pads.
- C. Sidewalks.
- D. Formwork and form liners.
- E. Reinforcing steel bars and accessories.
- F. Concrete mixes.
- G. Concrete testing.
- H. Concrete finishes.
- I. Concrete curing and protection.
- J. Bonding agent.
- K. Concrete slab sealer.
- L. Repair to new defective (and existing) concrete.
- M. Non-shrink grout.
- N. Waterstops.
- O. Joint filler and sealant.
- P. Restrictions regarding embedments in concrete.

1.02. RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS
- B. Section 05505 – 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
[ACI 350	Code Requirements for Environmental Engineering Concrete Structures]

B. American Society for Testing and Materials (ASTM)

ASTM A185	Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A497	Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
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

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:
 - cement
 - pozzolans (fly ash and slag)
 - fine aggregate
 - coarse aggregate
 - water
 - 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 – As applicable, 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 cuts for chemical adhesive system used to install dowels and threaded anchor bolts into hardened concrete and masonry.
- I. Submit catalog cuts for joint filler and sealant.
- J. Submit catalog cut for slab sealer.
- K. Submit catalog cuts for waterstops and waterstop accessories, clearly indicating which item(s) are to be used.
- L. Submit catalog cut for curing compound with fugitive dye specifically indicated.
- M. Submit catalog cut for dampproofing.
- N. Submit catalog cut for integral concrete coloring (dyes). Include color chart to show all available colors that can be selected.
- O. Submit catalog cut(s) for Owner's selection of form liner. A 2-foot square sample of selected form liner (by Owner) shall be submitted for final approval.
- P. If concrete repairs are needed, the Contractor shall submit proposed repair products and procedures specified in Part 3 of this specification.
- Q. Submit special requests for embedment of conduit, etc. Reference restrictions in Part 3 of this specification.

1.05. COORDINATION

- A. Coordinate all concrete placements with work (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, access hatches, 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 Massachusetts DOT.
- 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 of concrete.
 - 1. Exposed edges and outside corners of concrete shall be formed with 3/4-inch by 3/4-inch chamfer forming strips.
 - 2. Downstream side of weir plates shall be formed with 3-inch by 3-inch chamber 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 frost walls and retaining walls.
 - 3. Ties used for watertight and below-grade structures shall consist of a waterstop.

2.02. REINFORCING STEEL

- A. Deformed Reinforcing Bars - ASTM A615, Grade 60.
- B. Expansion joint dowel and sleeve system shall consist of a deformed or smooth dowel provided with a close fitting sleeve of plastic, or of steel pipe or conduit.
- C. Welded Wire Reinforcement (WWR) - ASTM A185 for plain wire, supplied in flat sheets only.
- D. 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

Mix A - All general uses not otherwise specified or provided for below

Mix C - Concrete fill topping

Mix D - Concrete thrust blocks and pipe encasements

Mix E - Sidewalks, curbs, exterior slabs

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⁾
A	4,500	#57	575	0.42	6.0
C	4,000	#7	550	0.44	6.0
D	3,000	#57	450	0.50	6.0
E	5,000	#57	600	0.40	6.0

(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. Without plasticizers, concrete slump for flatwork shall not exceed 3 inches. Wall concrete, columns, deep beams, and other vertical placements (without plasticizers) shall be placed with a maximum slump of 4 inches.

D. 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.
 - 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. 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. Test aggregates to show non-reactive.
 - d. Use fly ash (minimum 20 percent content) or slag.

D. Mixing Water - Clear and potable.

- 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; The 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 "MasterKure ER 50," L&M Construction Chemicals "E-Con," Dayton Superior "AquaFilm Concentrate J74" or equal.

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," The Euclid Chemical Company "Duralprep A.C.," Larsen Products Corporation "Weld-Crete," or equal.
- B. 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.
- C. Slab sealer shall be Sika Corporation "Sikagard 701W," Euclid Chemical Company "Euco-Gard 100," BASF Chemical Company "MasterProtect H 200," or equal.
- D. Waterstop material shall be PVC 6-inch x 3/8-inch ribbed center bulb waterstop No. CR-6380 by Wirestop of Paul Murphy Plastics Company; No. RB6-38 by Vinylex; No. 705 by Greenstreak; or equal.
- E. Where shown on the Drawings and where new concrete is cast against hardened concrete:
 - 1. Provide a premolded 1-inch by 3/4-inch bentonite self-adhering waterstop strip which expands on contact with water, applied with primer adhesive. The bentonite waterstop material shall meet the requirements of ASTM D217. Waterstop and adhesive shall be "Waterstop-RX" and "CetSeal" by CETCO Building Materials Group; "Swellstop" and "Swellstop Primer" by Greenstreak; or equal.

2. Use a bolt-on (retrofit), PVC waterstop set in epoxy adhesive against existing concrete and fastened down with stainless steel fasteners through stainless steel batten strips.
 - a. In walls or slabs less than 15 inches, use an L-shaped waterstop with a nominal 3-inch stem. Use Item #581 by Greenstreak, Item KK611 by Vinylex, or equal.
 - b. At expansion joints, use a T-shaped waterstop with a nominal 6-inch stem. Use Item #667 by Greenstreak, 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. Sealant for expansion joints in concrete structures [designed for submerged conditions to either contain or hold out liquids (including groundwater) such as tankage, basements, flow channels, galleries, etc. shall be a two-component NSF approved polyurethane material.

Use Sika Corporation "Sikaflex-2c," The Euclid Chemical Company "Eucolastic II," or equal.

- 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 5000 psi in seven days and 7000 psi in 28 days.

- I. After material sources have been established and approved, these sources shall not be changed for the duration of the project.

PART 3 EXECUTION

3.01. FORMS

- A. Earth cut forms shall not be used; all footings, base 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 columns, piers, walls, and other vertical members:	1/4 inch
b. For exposed corners of walls and columns, construction/ control joint grooves, and other conspicuous vertical lines:	1/4 inch
2. Variation from level or from grades specified:	
a. In slab soffits, ceilings and beam soffits, measured before removal of supporting shores:	1/4 inch
b. In exposed lintels, sills, parapets, grooves, 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 columns, 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 columns and beams 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	
7. Stairs	
a. Treads shall be level and true and top surfaces shall not vary more than 1/8 inch from side to side or back to front.	
b. Riser heights shall not vary more than 3/8 inch in height on any run of stairs.	
c. Tread depths shall not vary more than 3/8 inch in height on any run of stairs.	

3.03. CONCRETE COVER

- A. Clear concrete cover not indicated on Drawings shall conform to ACI 318 and ACI 350, as applicable. 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 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.

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:

- Truck number
- Date and time truck is batched
- Ticket number
- Mix designation of concrete (per paragraph 2.03.A)
- Cubic yards of concrete
- Cement brand, type and weight in pounds
- Weight in pounds of each size and type of aggregate
- Admixtures, brand and weight in pounds and ounces
- Moisture content of fine and coarse aggregates
- Water added to the batch at the plant
- Water added to the batch during transport
- 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.

- C. 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.
7. Do not embed conduit in beams.

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 where necessary.
- C. Vertical forms such as beam side forms, column forms, and 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. No structural forms supporting suspended slabs or beams shall be removed prior to concrete attaining at least 80 percent of the required design strength and less than 14 days. During cold weather conditions, field cured cylinders shall also be made to determine in-place concrete strengths.
- E. 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 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. 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 top of walls shall be 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.

Apply only a light troweled finish on tank base slabs or if the area is to receive a chemical-resistant finish (CRF).

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.

4. Type D - Concrete Floor Sealer - All concrete surfaces identified in the Finish Schedule, not scheduled to receive other coatings or coverings, shall be sealed as follows:
- a. Prior to applying floor sealer, thoroughly clean the concrete surface.
 - 1) At new concrete floors, remove all dirt, oil, grease, and other foreign matter with caustics and detergents.
 - 2) At existing concrete floors, the concrete shall first be cleaned using an abrasive brush-off blast, followed by caustics and detergents as needed.
 - b. Thoroughly rinse and apply two coats of sealer in accordance with manufacturer's recommendations.
 - 1) At new concrete floors, the first coating shall be applied as soon as possible after finishing and curing. The second coating shall be applied near project completion after installation of all equipment and piping and after completion of other related construction activities.
 - 2) At existing concrete floors, apply the first coating as soon as possible after the floor is cleaned. Apply the second coating near project completion after installation of all equipment and piping and after completion of other related construction activities.

E. Finish Schedules

TABLE 03001-1 - WALL (VERTICAL) FINISHES

Type I	Rough Form Finish - All concrete not exposed to view.
Type II	Smooth Form Finish - The interior of all liquid containment structures.
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, columns, curbs, equipment supports and pads, 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, for surfaces intended to receive roofing or tile, and for surfaces to receive a Type C broom finish.
Type B	Troweled Finish – For flow channels, tankage, and all areas where in contact with liquids.
Type C	Broom Finish - For sidewalks, exterior slabs and platforms, stair treads, landings, exterior and interior pedestrian ramps, loading docks, and other exterior walking surfaces.
Type D	Concrete Floor Sealer - For interior and exterior exposed to view slabs, sidewalks, stair treads, landings, etc.

3.10. CONCRETE EQUIPMENT 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, use 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.

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 the 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
 - 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 column] 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 walls [and columns] 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 wall curing is completed, the walls shall be further cured by immediately spraying the entire wall 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 waterproof paper or 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 (Note: Strip footings include footings of foundation and 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. In hot weather conditions (defined in ACI 305), provide curing procedures as outlined above along with additional provisions required by ACI 305.
- H. In cold weather conditions (defined in ACI 306) where heated enclosures are provided and 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.
- I. 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.

3.12. SEALING OF CONCRETE

- A. The concrete surfaces identified in the Finish Schedule shall be sealed as follows:
1. The first coating shall be applied as soon as possible after finishing and curing, and the second coating shall be applied near project completion after installation of all equipment and piping and after completion of other related construction activities.
 2. Apply sealer in accordance with manufacturer's recommendations.

3.13. TESTING FOR QUALITY ASSURANCE

- A. The Contractor 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 in excess of 5 cubic yards.
- 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.

3.14. REPAIR OF 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.

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.

Prior to repair, Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.

- 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 wall finish with surrounding area.

Surface preparation, mixing, and application shall be in conformance with manufacturer's recommendations.

Prior to repair, Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.

- D. Excessive surface cracking in concrete slabs as defined herein shall receive a penetrating epoxy resin sealer to 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. Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.

- E. All spalled, weakened, damaged or disintegrated concrete and areas of honeycombing shall be removed to sound concrete.

For spalled or honeycombing 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.

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 pound 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.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Non-shrink grout for setting of equipment, precast units, and baseplates.

1.02. RELATED SECTIONS

- A. Section 03001 - CONCRETE
- B. Section 05505 - CONCRETE AND MASONRY ANCHORS

1.03. REFERENCES

The publications listed below form a part of this specification.

- A. American Concrete Institute

ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 309	Practice for Consolidation of Concrete

- B. American Society for Testing and Materials

ASTM C31	Method of Making and Curing Concrete Test Specimens in the Field
ASTM C109	Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens)
ASTM C143	Test Method for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C1019	Standard Method of Sampling and Testing Grout
ASTM C1107	Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

1.04. SUBMITTALS

- A. Submit single-page catalog cuts for the following:
 - 1. Non-shrink grout.

PART 2 PRODUCTS

2.01. GROUT

- A. Non-Shrink Grout - Shall be a flowable, non-staining, cement-base product, manufactured premixed, requiring only the addition of water or latex mix solution as supplied by the grout manufacturer at the job site.

1. For supporting smaller equipment of 10 HP or less, use non-shrink grout with a minimum strength of 5000 psi at 28 days with a fluid consistency. Also use for setting of precast sills, etc.
2. For support of heavy equipment or other large loads, and when stresses from vibrations are involved or when equipment will be subject to thermal movement, use grout specifically manufactured for such applications.

Provide Engineer with manufacturer's certification for the use intended, including 2-inch by 2-inch grout cube strength tests in accordance with ASTM C109. Grout tests shall achieve 5000 psi in 7 days and 7000 psi in 28 days with a fluid consistency.

3. Non-shrink grout shall be applicable for damp, corrosive environments.
- B. Adhesive anchor systems used to install bolts into concrete and masonry and to install reinforcing dowels into concrete shall be as specified in Section 05505, Concrete and Masonry Anchors.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Prepare surfaces, mix products, and install grout per manufacturer's instructions.

3.02. GROUT MIXING

- A. When a scheduled grout placement will consist of 3 cubic yards or more, the grout shall be produced at a batch plant, not site mixed.

3.03. TESTING FOR QUALITY ASSURANCE

- A. Quality assurance testing shall be conducted by the Owner with samples tagged and sent to an independent laboratory.
- B. In general, testing will be conducted for each day where more than 1 cubic yard of grout is placed.
- C. Coordinate 48 hours in advance with the Engineer and testing laboratory to assure that testing can be accomplished. Provide free access to work and cooperate with the testing laboratory.
- D. The following tests may be performed by the testing laboratory:
1. Slump Test - Made on each batch of grout produced, in accordance with ASTM C143. Grout which exceeds the manufacturer's recommended slump shall not be used.
 2. Compressive Strength Test
 - a. Samples of freshly mixed grout will be taken and tested by the testing laboratory for compressive strength in accordance with ASTM C1019 except as modified herein.

- b. Each specimen will be identified by a tag, furnished by the Contractor, which will be attached to the side of the specimen.
- c. It is the Contractor's responsibility that specimens be stored in an approved storage box provided by the Contractor on the construction site for 48 hours after they have been molded at a temperature between 60 degrees F and 80 degrees F.
- d. After 48 hours, the specimens will be transported to the testing laboratory and moist cured until testing in accordance with ASTM C39. One specimen will be tested at 7 days, and two at 28 days.
- e. Should a 7-day or 28-day test strength from any specimen be lower than the specified compressive strengths, the Contractor shall immediately correct the mix for the next grout placement operation. Engineer will determine if installed grout must be replaced.

END OF SECTION

SECTION 05500

MISCELLANEOUS FABRICATIONS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Shop-fabricated ferrous and non-ferrous metal and fiberglass items, including miscellaneous framing, custom fabrications, bollards, lintels, shelf angles, bearing plates, anchor bolts, overhead door frames, ladders, access hatches, checkered floor plate panels, wall brackets, custom pipe supports, etc. and the FRP rain cover at the Methanol Fill Station.

1.02. RELATED SECTIONS

- A. Section 05505 – CONCRETE AND MASONRY ANCHORS
- B. Section 05510 - STAIRS
- C. Section 05520 - GUARDRAIL AND HANDRAIL

1.03. REFERENCES

ANSI A14.3	Ladders, Fixed, Safety Requirements
ASTM A36	Structural Steel shapes (36 ksi)
ASTM A53	Pipe, Steel, Black and Hot-Dip Galvanized
ASTM A123	Zinc Coating (Hot-Dip Galvanized) on Steel Products
ASTM A153	Zinc Coating (Hot-Dip Galvanized) on Steel Hardware
ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A307	Carbon Steel Bolts and Studs, 60 ksi Tensile Strength
ASTM A325	Structural Bolts, Heat Treated, 120/105 ksi Tensile Strength
ASTM A489	Carbon Steel Lifting Eyes
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A992	Structural Steel Shapes (50 ksi)
ASTM B209	Aluminum and Alloy Sheet and Plate
ASTM B221	Aluminum and Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM B632	Aluminum Tread Plate
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
AWS A2.0	Standard Welding Symbols
AWS D1.1	Welding Code - Steel
AWS D1.2	Welding Code - Aluminum
AWS D1.6	Welding Code – Stainless Steel
SSPC	Society for Protective Coatings

1.04. SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of welds, holes, fasteners, and accessories.
 - 2. Shop drawings shall be submitted in sets of similar fabricated items. Large submittals, generally over 10 sheets, consisting of several different fabricated items will be returned to the Contractor unreviewed.
 - 3. Resubmittals of shop drawings shall have all revisions/corrections clearly highlighted to the Engineer (e.g., labeled, clouded, etc.).
- B. Include detailed fabrication drawings with erection drawings, bill of materials, finishes, and applicable details such that each piece is easily identifiable and located on the project for both review/approval and installation.
- C. Submit manufacturer's product data for floor hatches, safety posts, stair nosings, and other manufactured items to include details of manufactured product with installation instructions.

1.05. COORDINATION

- A. Field verify all dimensions prior to submittal of shop drawings.
- B. Coordinate work of this section where required to tie into the work of other sections.

1.06. QUALIFICATIONS

- A. Weld procedures and welder personnel shall be AWS qualified. Keep procedures and certifications on file. Submit only when requested.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Steel Channels, Angles, and Plates: ASTM A36.
- B. "W"-Shape Steel Beams: ASTM A992.
- C. "S"-Shape Steel Beams: ASTM A36.
- D. Rectangular and Square Hollow Structural Sections (HSS): ASTM A500, Grade B.
- E. Aluminum Sections: ASTM B308 Alloy 6061-T6. Use Aluminum Association shapes.
- F. Stainless Steel Structural Shapes: ASTM A276, Type 316.
- G. Stainless Steel Angles and Plates: ASTM A276, Type 316.
- H. Aluminum Checkered Floor Plate: ASTM B632 Alloy 6061-T6.
- I. Pipe: Steel ASTM A53 Grade B. Aluminum alloy 6061-T6.

- J. Fiberglass Fabrications: All structural shapes shall be manufactured using the pultrusion process with a minimum glass content of 45 percent. Use extra corrosion-resistant vinyl ester resin material for all shapes and plates. All fiberglass resin shall contain an integral UV inhibitor and be produced with a resin-rich surface to protect against exposure and wear.
- K. Bolts: ASTM F593 stainless steel, Type 316; ASTM A325 carbon steel; galvanized bolts as a manufactured assembly to ASTM A153; ASTM A489 steel eyebolts.
- All bolt accessories including nuts, washers, etc. shall be of the same material as the bolt.
- L. Bolted Attachment to Concrete and Masonry: For structural loads, use minimum 5/8-inch diameter stainless steel adhesive anchors as specified in Section 05505, Concrete and Masonry Anchors. Expansion anchors are not allowed unless specifically requested by Contractor for a particular application and approved by Engineer.
- M. Cast-In Anchor Rods (Bolts): ASTM F1554 anchor rods galvanized to ASTM A153. Use 3/4-inch diameter rods (L-bolts) bent 90 degrees with 3-inch hook. Anchor rods shall be 18 inches long or as shown on Contract Drawings. Reference Section 05505, Concrete and Masonry Anchors.
- N. Welding Materials: AWS D1.1 and D1.2; type required for materials being welded.
- O. Touch-Up Primer for Galvanized Surfaces: Zinc-rich paint.
- P. Bollards: 6-inch steel pipe; concrete filled, crowned cap; prime and finish paint or cover with a PVC sleeve as indicated.
- Q. Lintels are required in masonry openings larger than 16 inches for concrete block and 8 inches for brick. Provide masonry lintels combined with hot dip galvanized steel brick lintels as shown on Contract Drawings, at doors, windows, HVAC accessories, access panels, and pipes, extend 8 inches beyond opening (each side).
- R. Bearing plates with minimum two 5/8-inch diameter by 4-inch long welded studs to be embedded in grout-filled masonry bond beams.
- S. Anchorage for metal items cast in concrete shall have welded-on strap anchors 2 feet o.c., made from 1/4-inch thick x 1-inch wide x 6-inch long bar stock with each end bent 90 degrees.
- T. Overhead Door Frames: Use hot dip galvanized structural channel as indicated with 1/4-inch x 2 inches x 2 feet long welded strap anchors at 2 feet o.c. vertically, turn up ends.
- U. Sill angles at overhead door sill shall be stainless steel.
- V. Floor Hatches
1. Exterior: Use 1/4-inch aluminum checkered plate hatch with watertight gasket seal, aluminum channel frame with drain coupling, backpainted, complete stainless steel hardware including slam lock with security cover plug. Extend drain to exterior or to sump.
 - a. For any hatch installation at 12 inches or less elevation above finished grade, provide for H-20 load capacity, use standard size (except at hatches above ladders use custom size 30-inch X 38-inch) single- or double-leaf Bilco Type

J-AL H20 or JD-AL H20, Syracuse Castings Model DT-HD or DTD-HD, Halliday Products Series H1W or H2W, or equal.

- b. For 300 psf load capacity, only at exterior hatches in surfaces located greater than 12 inches above finished grade or roadway, and not accessible to vehicles, are allowed to have a reduced 300 psf load capacity if not otherwise specified as an H20 hatch in the Contract Documents. Use standard size (except at hatches above ladders use 30-inch X 38-inch) single- or double-leaf Bilco Type J-AL or JD-AL; Syracuse Castings Model CH or CHD; Halliday Products Series W1R or W2R; or equal.
2. Interior: Use 1/4-inch aluminum checkered plate hatch with watertight gasket seal, aluminum angle frame, backpainted, 300 psf load capacity, complete stainless steel hardware including slam latch with flush lift handle.

Use standard size (except at hatches above ladders use custom size 30-inch X 38-inch) single- or double-leaf Bilco Type K-AL or KD-AL, Syracuse Castings Model EC or ECD, Halliday Products Series S1S or S2S, or equal.

3. Rooftop
 - a. For ladder access, use a custom size 30-inch X 38-inch, heavy duty, single-leaf, aluminum roof scuttle, fully gasketed, insulated cover with insulated curb. Provide one lockable hand latch mechanism designed for easy opening from the inside, no handle on the exterior. Provide compression springs for smooth operation. All accessories are stainless steel.
 - b. Roof equipment scuttles, use heavy duty aluminum, double leaf construction, fully gasketed insulated covers with insulated curb. Provide secure lockable mechanism from outside. All accessories are stainless steel.
4. Provide a hinged FRP safety grate fall-through protection system at all floor hatches including hatches for ladder egress. The safety grate shall not reduce the clear opening of the specified hatch size.

W. Ladders: General

1. Rungs
 - a. Square or rectangular in profile with ridged or serrated non-slip top surface, capable of supporting a 300-lb. concentrated load at any point along the length of the rung without failure or permanent deformation.
 - b. Vertical spacing of rungs to be equal, from floor to upper landing, and not to exceed 12 inches.
 - c. Centerline of rungs to be 7 inches from wall or other surface or obstruction opposite climber.
 - d. Material to match side rails.
2. See Drawings for specific configurations.
3. Ladders to conform in all respects to the requirements of OSHA 1910.27.

4. Side rails shall be supported by brackets with a maximum vertical spacing of 48 inches o.c. Secure brackets to wall with 5/8-inch diameter adhesive anchors, 4-inch minimum embedment.
 5. Bolts to be Type 316 stainless steel, minimum 5/8-inch diameter.
- X. Aluminum Ladders
1. 6061-T6 or 6063-T5 mill finish aluminum.
 2. All welds and sharp edges to be ground smooth.
 3. Side rails shall be minimum 1 1/2-inch diameter, schedule 40 pipe.
- Y. Provide aluminum telescoping safety post at all ladders below hatches, "Ladder UP" by Bilco, "Safety Post" or "Safety Extensions" by U.S.F. Fabrication, or equal.

2.02. FINISHES

- A. Prepare steel surfaces in accordance with SSPC SP-6.
- B. Shop prime paint steel items, not galvanized, and top coat after installation. Do not prime surfaces where field welding is required.
- C. Hot dip galvanize in accordance with ASTM A123 or A153. Provide minimum 2.0 oz/sq.ft. galvanize coating.
- D. Unless noted otherwise, aluminum shall be mill finish.
- E. Aluminum in contact with concrete or masonry shall be backpainted with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that field conditions are acceptable and are ready to receive work. Measurements and dimensions to be field verified.
- B. Beginning of installation means Contractor accepts existing conditions.

3.02. FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Welds shall be continuous unless noted otherwise.
- D. Exposed Mechanical Fastenings: Unobtrusively located, consistent with design of component.
- E. Supply components required for anchorage of fabrications. Aluminum and fiberglass fabrications require stainless steel fasteners.

- F. Fiberglass Fabrications: All cuts and drilled holes shall be sealed with clear vinyl ester resin to provide maximum corrosion resistance.

3.03. FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16-inch.
- C. Maximum Misalignment of Adjacent Members: 1/16-inch.
- D. Maximum Bow: 1/8-inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16-inch in 48 inches.

3.04. INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS.
- D. Fasten aluminum and/or fiberglass fabrications using Type 316 stainless steel bolts.
- E. Carbon steel bolts shall only be used for painted carbon steel framing connections.
- F. Use galvanized or stainless steel bolts at galvanized fabrications.
- G. Isolate dissimilar metals with dielectric and appropriate fasteners.
- H. Obtain Engineer approval prior to site cutting or making adjustments not indicated.
- I. Prior to installation, aluminum surfaces in contact with concrete and/or masonry require backpainting.
- J. After erection, touch up paint welds, bolts, connection material, and abrasions.
- K. Top paint all exposed steel that is not galvanized.
- L. Fiberglass Fabrications: All field cuts and drilled holes shall be sealed with clear vinyl ester resin as supplied by the manufacturer to provide maximum corrosion protection.

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb: 1/4-inch.
- B. Maximum Offset From True Alignment: 1/4-inch.
- C. Maximum Out-of-Position: 1/4-inch.

END OF SECTION

SECTION 05505

CONCRETE AND MASONRY ANCHORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Post-installed chemical adhesive anchor system for installing bolts and reinforcement dowels into concrete and masonry.
- B. Limited use of post-installed mechanical anchors in concrete and masonry.
- C. Cast-in anchors for attachment to concrete and masonry.

1.02. RELATED SECTIONS

- A. Section 05500 – MISCELLANEOUS FABRICATIONS
- B. Section 05510 - STAIRS
- C. Section 05520 - GUARDRAIL AND HANDRAIL

1.03. REFERENCES

ACI 318	Building Code for Structural Concrete
ACI 355.2	Qualifications of Post-Installed Mechanical Anchors in Concrete
ACI 355.4	Qualifications of Post-Installed Adhesive Anchors in Concrete
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A325	Structural Bolts, Heat Treated, 120/105 ksi Tensile Strength
ASTM A449	Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A615	Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM E488	Strength of Anchors in Concrete and Masonry Elements
ASTM E1512	Testing Bond Performance of Bonded Anchors
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594	Stainless Steel Nuts
ASTM F1554	Anchor Rods, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F2329	Zinc Coating, Hot-Dip
ICC-ES AC58	Acceptance Criteria for Post-Installed Adhesive Anchors in Masonry
ICC-ES AC106	Acceptance Criteria for Post-Installed Mechanical Anchors in Masonry
ICC-ES AC193	Acceptance Criteria for Post-Installed Mechanical Anchors in Concrete
ICC-ES AC308	Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete

1.04. SUBMITTALS

- A. Submit catalog cuts for post-installed anchor products to be used for anchoring bolts and dowels into concrete and masonry. Catalog cuts (do not submit whole catalogs) shall be clearly marked to include:
 - 1. Manufacturer's installation instructions.
 - 2. Allowable temperature range for anchor installation and curing.

- B. Submit the ICC-ES Evaluation Service Report (ESR) for proposed anchor system.
- C. Submit data on threaded rods to be used, including materials, sizes, lengths, etc.
- D. Submit letter from anchor manufacturer which indicates successful completion of product installation training.
- E. Submit catalog cuts on mechanical, expansion-type anchor bolts when use is previously approved.
- F. Submit name of Contractor's testing laboratory that will complete proof -load testing.

1.05. QUALITY ASSURANCE

- A. Only post-installed anchor products listed in Part 2 are acceptable for use on this project. Substitutions will only be considered for products having an applicable ICC-ES Evaluation Service Report. Substitution requests shall include calculations, signed and sealed by a professional engineer registered in the state of Maryland, that demonstrate the substitute product is capable of achieving the performance values required by this specification.
- B. Prior to installation of the approved anchor, contact the Manufacturer's representative to provide product installation training and a letter indicating successful completion of product installation training.
- C. A five percent sample of installed anchors shall be proof-loaded by an independent testing laboratory contracted by the Contractor. The quantity of samples and locations shall be determined by the Engineer. Test results shall be submitted to the Engineer.

1.06. COORDINATION

- A. Coordinate the placement of anchor bolts with approved items and fabrications.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Anchor adhesive shall be a high-strength, premeasured, two-part, self-mixing, cartridge-type adhesive system.
- B. Adhesive system used to install threaded rod anchors and reinforcing bars into concrete shall be "SET-XP (ESR-2508)" by Simpson; Strong-Tie Company, Inc., "HIT-HY 150 MAX (ESR-2262) or HIT-RE 500-SD (ESR-2322)" by Hilti, Inc., or equal.
- C. Adhesive system used to install threaded rod anchors and reinforcing bars into grouted masonry shall be "SET (ESR-1772)" by Simpson; Strong-Tie Company, Inc., "HIT HY 150 MAX (ESR-1967)" by Hilti, Inc., or equal.
- D. Adhesive system used to install threaded rod anchors into hollow core masonry using a mesh screen tube; shall be "SET (ESR-1772)" by Simpson; Strong-Tie Company, Inc. or equal.

MINIMUM REQUIRED ULTIMATE LOAD CAPACITIES			
ROD SIZE (DOWEL)	MINIMUM EMBEDMENT ⁽¹⁾ (INCHES)	MINIMUM ULTIMATE TENSILE STRENGTH ⁽²⁾ (LBS.)	MINIMUM ULTIMATE SHEAR STRENGTH ⁽²⁾ (LBS.)
3/8" (#3)	3-1/2	6,000	5,000
1/2" (#4)	4-1/2	10,000	9,000
5/8" (#5)	5-1/2	14,000	15,000
3/4" (#6)	6-3/4	18,000	20,000
7/8" (#7)	7-3/4	30,000	30,000
1" (#8)	9	43,000	33,000

(1) Minimum embedment depths unless noted otherwise on the Contract Drawings.

(2) Ultimate strengths are based on bond strength to minimum 2,000 psi concrete.

- E. Stainless Steel Threaded Rods – ASTM A593, Type 316.
- F. Stainless Steel Nuts – ASTM A594, Type 316.
- G. Reinforcing Steel Dowels – ASTM A615, Grade 60 deformed bar.
- H. Cast-in Anchor Rods (Bolts) – ASTM F1554 anchor rods galvanized to ASTM A153 or F2329. Use 3/4-inch diameter rods (L-bolts) bent 90 degrees with 3-inch hook. Anchor rods shall be 18 inches long or as shown on the Contract Drawings.
- I. Threaded rods and anchor bolt accessories, including nuts, washers, etc. shall be of the same material as the rods/bolts.
- J. Mechanical Anchors – (expansion-type) are not allowed unless specifically requested (for a special application) by the Contractor and approved by Engineer in writing. When approved, expansion-type anchors shall be stainless steel. Anchors shall be rated for a minimum of twice the required load capacity. Refer to limitations of use stated in Part 3.

PART 3 EXECUTION

3.01. INSTALLATION OF ADHESIVE ANCHOR SYSTEMS

- A. All bolted connections to concrete and masonry shall utilize an adhesive anchor system as specified above.
- B. Threaded stainless steel rods shall be used for all anchor bolt applications.
- C. Provide templates or other means to accurately locate anchors.
- D. Drilled holes shall be cleaned out and shall be free of dust and trapped water by using oil free compressed air and brushes.
- E. Masonry wall (cores) shall be filled with masonry grout where anchors are to be installed. In existing construction where masonry cores are not (and cannot be) grout filled (hollow core masonry), manufacturer's mesh screen tube shall be used with adhesive anchor installation.
- F. Install adhesive anchors in accordance with manufacturer's recommendations.
- G. Bolts installed into concrete and masonry shall not be closer than 6 inches on centers.

- H. All structural members bolted to concrete and masonry shall be made with a minimum of two 5/8-inch diameter anchors at each end of member.
- I. Anchor bolts and dowels shall be clean and free of coatings or other contaminants that would impair bonding to the chemical adhesive.
- J. Threaded rods shall be long enough to project through the entire depth of nut and shall be cut off at 1/2 inch beyond the top of nut.
- K. Anchor bolts shall not be installed in concrete less than seven days old, or older if recommended by the manufacturer.
- L. Adhesive anchors shall be installed following all criteria as listed in the respective ESR. Adhesive shall be fully cured prior to applying load on anchor.

3.02. INSTALLATION OF CAST-IN ANCHORS

- A. All cast-in anchors shall be hot-dip galvanized unless noted otherwise in the Contract Documents.
- B. Provide templates or other means to accurately place anchors.
- C. Anchors shall be secured in place to not allow displacement during placement of concrete or masonry grout.
- D. Concrete or masonry grout shall be thoroughly vibrated around the anchors for proper bonding of the anchors.
- E. Anchor rods shall be long enough to project through the entire depth of nut and shall be cut off at 1/2 inch beyond the top of nut.
- F. Concrete or masonry grout shall be at full 28-day compressive strength prior to applying load on anchor.

3.03. INSTALLATION OF MECHANICAL ANCHORS

- A. Mechanical (expansion-type) anchors will only be considered for overhead (ceiling) applications where thru-bolting cannot be performed. Mechanical anchors are not allowed for any other use unless specifically requested (for a special application) by the Contractor and approved by Engineer in writing.
- B. Mechanical anchors shall support static tension loads not exceeding 200 lbs. per anchor.
- C. Drilled holes shall be cleaned out and free of dust.
- D. Anchors shall be fully seated prior to pretension. Pretension in accordance with manufacturer's instructions.
- E. Engineer may request any/all of these mechanical anchors to be proof-loaded.

END OF SECTION

SECTION 05510

STAIRS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Framing for aluminum stairs use structural sections.
- B. Treads for aluminum stairs are open grate.
- C. Risers are closed using aluminum plate.
- D. Landings as part of the stair system, use open grating to match tread design.

1.02. RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS
- B. Section 05505 – CONCRETE AND MASONRY ANCHORS
- C. Section 05520 - GUARDRAIL AND HANDRAIL

1.03. REFERENCES

- A. See Section 05500, Miscellaneous Fabrications.

1.04. DESIGN REQUIREMENTS

- A. Fabricate stairs and landings to support a live load of 100 lb/sq.ft. and a concentrated load of 300 lbs, with deflection of stringers or landing framing not to exceed 1/240 of span. Deflection of treads not to exceed 1/4 inch.
- B. Fabricate guardrail and handrail per Section 05520, Guardrail and Handrail.

1.05. SUBMITTALS

- A. Shop Drawings - Include complete fabrication details and erection plans, including connections, attachments, reinforcing, treads, risers, landings, anchorage, size and type of fasteners, accessories, and all dimensions. Photocopies of Contract Drawings, in whole or in part, are not acceptable.
- B. Indicate welded connections using standard AWS welding symbols.
- C. Submit product data for manufactured items, with items of intended use, highlighted or otherwise indicated.

1.06. FIELD MEASUREMENTS

- A. Field verify all measurements before fabrication.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Reference Section 05500, Miscellaneous Fabrications, for stair and landing framing.
- B. For grating treads, reference Section 05531, Grating and Floor Plate.
- C. Fasteners for aluminum fabrications shall be Type 316 stainless steel.

2.02. FABRICATION - GENERAL

- A. Reference Section 05500, Miscellaneous Fabrications, for general fabrication requirements and Section 05520, Guardrail and Handrail, for railing.
- B. Fit and shop assemble in largest practical sections, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Seal jointed pieces by continuous welds.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Supply components required for anchorage of fabrications. Use stainless steel connectors on aluminum.
- G. Clean, straight, sharply-defined profiles with smooth surfaces of uniform color, free from defects. Welding on unexposed side in order to prevent pitting or discoloration. Finish to be free from scratches, "leave-off marks," or other surface blemishes.
- H. Provide all hangers, framing clips, anchors, etc., required for complete installation.

2.03. FABRICATION - ALUMINUM OPEN GRATING STAIRS AND LANDINGS

- A. Refer to Section 05531, Grating and Floor Plate, for treads, grating, and abrasive nosing.
- B. Fabricate stringers using aluminum channels.
- C. Fabricate treads and landings using minimum 1-1/2-inch deep grating as indicated. Support with angles or channels to meet design load requirements.
- D. Solid risers are custom fabricated using bent aluminum plate attached to the treads as indicated.

2.04. FINISHES

- A. Backpaint aluminum surfaces in contact with concrete and masonry with bituminous paint.
- B. Aluminum surfaces to be mill finish.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means Contractor accepts existing conditions.

3.02. INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. All bolts shall be stainless steel and anchors to concrete or masonry shall be stainless steel, adhesive type per Section 05505, Concrete and Masonry Anchors.
- D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Whenever possible, weld rather than bolt. Field weld components indicated on shop drawings. Perform welding in accordance with AWS. Grind welds smooth.
- F. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings, as applicable.
 - 1. Bolt threads shall not project beyond nuts more than one thread or shall be cut off and ground smooth.
 - 2. After erection, upset threads to prevent nut from loosening.
- G. Mechanically fasten joints butted tight. Grind welds smooth and flush.
- H. Obtain Engineer approval prior to site cutting or making adjustments not indicated.
- I. Exposed work shall be neatly finished. Joints shall be made true and tight.

3.03. INSTALLATION TOLERANCES

- A. Maximum Variation from Plumb - 1/4-inch.
- B. Maximum Offset from True Alignment - 1/4-inch.

END OF SECTION

SECTION 05520

GUARDRAIL AND HANDRAIL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aluminum pipe guardrail and handrail (both referred to as railing).
- B. Railing to be assembled using non-welded components with internal splice insert system that produces a consistent outside diameter of fittings and railing.

1.02. RELATED SECTIONS

- A. Section 05500 - MISCELLANEOUS FABRICATIONS
- B. Section 05505 - CONCRETE AND MASONRY ANCHORS
- C. Section 05510 - STAIRS

1.03. REFERENCES

ASTM B221	Aluminum-Alloy 6063 Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B241	Aluminum-Alloy 6063 Seamless Pipe and Extruded Tube

1.04. DESIGN REQUIREMENTS

- A. Railing assembly, wall rails, and attachments to resist the maximum force from a concentrated lateral load of 200 lbs. or a uniform load of 50 lbs. per linear foot at any point or direction without damage or permanent set.
- B. Vertical posts must withstand concentrated load applied at the top of 200 lbs. with a 4 foot 0 inch maximum post spacing.

1.05. DELIVERY, STORAGE AND HANDLING

- A. Protect from corrosion, deformation and other types of damage. Store items in an enclosed area free from contact with soil and weather. Replace damaged items with new materials.

1.06. SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, accessories, materials, and finishes.
- B. Provide detailed shop fabrication and erection drawings to include connections, fittings, complete bill of materials, finishes, etc.
- C. Product Data: Provide single-page catalog cut sheets on all manufactured items.
- D. Samples: Submit one 12-inch long assembled sample of railing. Sample to include one elbow, tee, wall bracket, toeboard, escutcheon, end stop, and base detail showing orientation to run of railing. Sample shall represent quality of workmanship and welding as applicable.

1.07. FIELD MEASUREMENTS

- A. Field verify all dimensions before fabrication.

1.08. COORDINATION

- A. Where work of this section is required to tie into the work of other sections, the Prime Contractor shall coordinate such tie-in.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Julius Blum and Company: Connectorail system with #7571 floor flange or #757/758 fascia flange (aluminum).
- B. Moultrie Mfg. Company: Wesrail II system with #WII4HB base or #WIISMBEXT side-mount bracket (aluminum).
- C. Tubular Specialties Mfr., Inc.: Adaptarail system with #662 floor flange (aluminum).
- D. Or equal. Substitutions are allowed provided that the submitted manufacturer can demonstrate satisfaction of load requirements as stated above.

2.02. ALUMINUM RAILING SYSTEM

- A. Rails: 1-1/2-inch diameter, extruded aluminum Schedule 40 pipe per ASTM B241. Roll rails to match radius of circular structures.
- B. Posts: 1-1/2-inch diameter, extruded aluminum pipe per ASTM B241, spaced at 4'-0".
 - 1. Use Schedule 40 pipe for top-mounted systems.
 - 2. Use Schedule 80 pipe for side-mounted systems.
- C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined aluminum.
- D. Weld using aluminum filler alloy 5356 to improve color match after anodizing treatment.
- E. Mounting: Pre-manufactured, heavy duty, four-bolt floor flange with internal reinforcement post or four-bolt side-mount fixture.
- F. Splice Connectors: Concealed spigot machined aluminum.
- G. Exposed Fasteners: Stainless steel screws, bolts, or rivets; consistent with design of railing.
- H. Vertical posts to be spaced at 4 feet 0 inches o.c. maximum.
- I. Toeboards shall be manufacturer's standard, OSHA compliant. Roll toeboards to match curved railing on circular structures.

2.03. FABRICATION

- A. Fabricate railing system with compatible connectors, fittings and fasteners. Joints to be mechanical without welding. Provide floor and wall brackets, terminals, flanges and caps, etc., for a complete installation. Railing details to be as indicated.
- B. Fit and shop assemble components in largest practical sizes, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Supply components required for anchorage of fabrications. Fabricate related components of same material and finish as fabrication.
- E. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Accurately form components to suit stairs, landings, and building structure. Terminate stair handrails as indicated.
- G. All railings shall be protected from entrapped water and from temperature-induced stresses. The railing manufacturer shall provide weep holes and expansion joints at 20 foot intervals.
- H. Toeboards shall be provided at all railings whether shown or not. Toeboards shall be rolled to match curved railing and be fastened at each post. Provide expansion joints at 20 feet maximum intervals with 1/4-inch opening.
- I. Install toeboards up to and in front of all gates.

2.04. FINISHES

- A. Aluminum railing systems shall receive a clear anodized finish meeting AAMA Class 1.
- B. Aluminum toeboards shall be mill finish.
- C. Backpaint aluminum surfaces in contact with concrete or masonry with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.02. PREPARATION

- A. Supply items required to be cast into concrete and embedded in masonry.

3.03. DISSIMILAR MATERIALS

- A. Make connections using stainless steel fasteners.
- B. Aluminum in contact with concrete or masonry to be backpainted.

3.04. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide and install anchors, plates or angles required for connecting railings to structure.
- D. Field weld as required on shop drawings. Grind welds smooth.
- E. Conceal bolts and screws whenever possible.

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb: 1/4-inch.
- B. Maximum Offset From True Alignment: 1/4-inch.

END OF SECTION

SECTION 05531

GRATING AND FLOOR PLATE

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aluminum floor grating and stair treads.
- B. Perimeter frames and support.

1.02. RELATED SECTIONS

- A. Section 03001 - CONCRETE: Framed concrete opening.
- B. Section 05500 - MISCELLANEOUS FABRICATIONS
- C. Section 05510 - STAIRS: Framing for grating and stair treads.

1.03. REFERENCES

AWS A2.4	Standard Symbols for Welding
AWS D1.2	Welding Code - Aluminum
NAAMM MBG 531	Metal Bar Grating Manual
NAAMM MBG 533	Welding Specifications for Fabrication of Steel, Aluminum, and Stainless Steel Bar Grating
ASTM A48	Gray Iron Castings
ASTM B221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B308	Aluminum Alloy 6061-T6 Standard Structural Shapes
ASTM B632	Aluminum Tread Plate

1.04. PERFORMANCE REQUIREMENTS

- A. Grating - Uniform live load of 100 lb/sq.ft and a concentrated load of 300 lbs. Stair landings are not to be used as equipment staging areas.
- B. Maximum Allowable Deflection Under Live Load - 1/240 of span for aluminum grating. Fiberglass grating maximum allowed deflection is 1/4 inch.
- C. Clear space between bearing bars of grating shall be 1 inch or less.

1.05. SUBMITTALS

- A. Shop Drawings - Indicate details of gratings, stair treads, checkered floor plate panel fabrications, component supports, fasteners, openings, perimeter construction details, and tolerances.
- B. Provide detailed fabrication and erection drawings showing all panel sizes and layouts.
- C. Product Data - Provide grating manufacturer's span and deflection tables.

- D. Provide catalog cut showing cast iron frame and grating.
- E. Samples for aluminum grating:
 - 1. Edge Support Frame - 10-inch square corner section to show workmanship, anchors, welding, and finish.
 - 2. Grating Samples - 10-inch square to illustrate style, surface finish, welding, edge banding, and workmanship.
 - 3. Attach grating samples to frame samples with proposed grating anchor.

1.06. QUALIFICATIONS

- A. Weld procedures and welder personnel must be AWS qualified. Maintain procedures and certificates on file.

1.07. FIELD MEASUREMENTS

- A. Field verify all dimensions prior to fabrication.

1.08. COORDINATION

- A. Coordinate work with concrete placement.
- B. Coordinate work with placement of frames, openings, piping, conduit, etc.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Aluminum Grating
 - 1. IKG Industries - Product: Aluminum rectangular bar, Type BS, serrated surface. IKG Industries extruded frame.
 - 2. Ohio Gratings, Inc. - Product: Aluminum bar Type 19-SG-4, serrated surface. Ohio Gratings extruded angle frame.
 - 3. Or equal.
- B. Grated Stair Treads - Provide same type, finish, and bar spacing as aluminum floor grating. Use manufacturer's standard non-slip nosing on treads.

2.02. MATERIALS

- A. Aluminum Grating, Stair Treads, and Frames - ASTM B221 alloy 6061-T6 or 6063-T6; mill finish.

2.03. DISSIMILAR MATERIALS

- A. Where dissimilar metals contact, provide approved dielectric of laminated plastic.
- B. Backpaint aluminum support frames and angles in contact with concrete or masonry using a bituminous paint.

2.04. ACCESSORIES

- A. All fasteners, including hold-down clips, handles, etc. to be Type 316 stainless steel.
- B. Grated stair treads and grated landing edges at top of stairs to have abrasive nosings.

2.05. FABRICATION

- A. Edge band all aluminum grating sections and checkered plate panels (80 pounds maximum weight per section). Set perimeter edge banding flush with top of grating or panel and surrounding construction.
- B. In exception to NAAMM MBG 533 (2.1 Welding Standards), welds to be within lower 75 percent of depth of grating bar, not extending to top edge of grating bar.
- C. Grated covered areas require fabricated frames embedded into concrete. When embedment into concrete is not possible, angles shall be attached to the concrete walls with 5/8-inch diameter Type 316 stainless steel adhesive anchors.
 - 1. Aluminum Frames - Shop fabricated, miter cut and welded corners. Frames to be four-sided fabrications where practical, of 1/4-inch thick aluminum sections, as indicated. Welds to be ground smooth.
- D. For all grated areas, the grating shall be cut such that all cross bars or patterns are in alignment when viewed perpendicular to the span of the grating.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that opening sizes and dimensional tolerances are acceptable.
- B. Ensure that supports, anchors, edge bands and frames are correctly positioned.

3.02. INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Place frames in correct position, plumb and level.
- C. Mechanically cut aluminum components.
- D. Anchor grating by bolting through stainless steel clips at four corners to prevent movement. For solid surface grating, use Type WLP structural clips. Wedges or shimming devices will not be permitted.
- E. Brackets, supports, and other details not shown on the Contract Drawings, but necessary for the work, shall be furnished. To this extent, at all areas where the Contractor modifies existing grating or installs new grating or checkered plate panels, include all required labor and materials to provide additional miscellaneous supports, anchors, and banding as required for a complete installation as determined by Engineer. All grating bearing bars shall be banded and completely supported and not allowed to deflect by hanging off cross bars.
- F. Items to be installed in conformance with specifications and details shown on approved shop drawings with all parts in alignment, true, and rigid.

- G. Install grating and checkered plate panels up to all gates and other penetrations. Install removable sections over all stop plates. Completed installation shall not leave gaps greater than 1-inch.

3.03. INSTALLATION TOLERANCES

- A. Conform to NAAMM MBG 531 and below.
 - 1. Maximum Space Between Adjacent Sections - 1/8-inch.
 - 2. Maximum Variation From Top Surface Plane of Adjacent Sections - $\pm 1/8$ -inch.

END OF SECTION

SECTION 11291

SLIDE GATES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish, install, and test, slide gates and operators complete with all necessary accessories, in compliance with these specifications and as shown on the Drawings.
- B. Data not specified in this Section shall be the manufacturer's standard for the size equipment specified.

1.02 RELATED SECTIONS

- A. The specification sections listed below are an integral part of this equipment specification and the Contractor shall be responsible for providing these sections to the equipment suppliers.
 - 1. Section 01300 – SUBMITTALS
 - 2. Section 01600 – MATERIALS AND EQUIPMENT

1.03 REFERENCES

ASTM A36	Structural Steel
ASTM A123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips
ASTM A276	Standard Specification for Stainless Steel Bars and Shapes
ASTM A575	Steel Bars, Carbon, Merchant Quality M-Grade
ASTM A576	Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM B209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B221	Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B308	Aluminum Structural Shapes (Alloy 6061-T6)
ASTM D2000	Rubber Products
ASTM D4020	Standard Specifications for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
AWWA C562	Fabricated Aluminum Slide Gates

1.04 PERFORMANCE REQUIREMENTS

- A. All gates shall meet the leakage requirements of AWWA Standard C562, latest edition. In no case shall leakage exceed 0.1 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.

1.05 QUALITY ASSURANCE

- A. In the case of an "or-equal" or a substitution, demonstrate in writing to the satisfaction of the Owner that the manufacturer has produced the specified type and size of equipment for

sanitary wastewater service that has been in successful operation for a minimum period of five years prior to the Bid date.

1.06 SUBMITTALS

- A. Submittals shall be in accordance with Section 01300 and as specified herein. Submittals shall include as a minimum:
 - 1. Shop drawings.
 - 2. Manufacturer's operation and maintenance manuals and information.
 - 3. Manufacturer's installation certificate.
 - 4. Manufacturer's equipment warranty.

1.07 SPARE PARTS

- A. The following spare parts shall be provided in clearly identified dust-proof containers for each type of gate operator:
 - 1. One (1) lift nut.
 - 2. Battery operated drill-type tool suitable for operating the manual gates after removal of the gate hand wheel. One drill-type tool shall be provided for each size operating nut.

1.08 EQUIPMENT WARRANTIES AND GUARANTEES

- A. The equipment manufacturer shall guarantee for a period of three-years starting at the time of equipment delivery to the job site or one-year starting at the time of Substantial Completion (whichever guarantee period end date is later), that the equipment supplied is free from defects in materials or workmanship and will meet the specified performance requirements when operated in accordance with the manufacturer's recommendations. The manufacturer shall correct any breach in this warranty at their expense.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The slide and weir gate manufacturers shall be the following or equal:
 - 1. Whipps, Inc., Athol, MA.
 - 2. RW Gate Company, Troy, NY.
 - 3. WACO Inc., Baltimore, MD.
- B. All gates provided under this Section 11291 shall be by a single manufacturer.

2.02 EQUIPMENT DESIGN

A. General

1. Gates shall be fabricated of the material of the size and type scheduled or detailed on the Drawings. Gates shall conform to the applicable standards listed herein.
2. All materials used in the construction of the gates and appurtenances shall be designed for the application and shall conform to the material specifications listed for each type of gate. All equipment including frames, discs, guides, stems, stem couplings, stem connections, assembly bolts, studs, nuts, and anchor bolts shall be designed for the design head such that the working stress shall not exceed 1/2 the tensile, compressive, and shear yield strength and 1/4 the ultimate tensile, compressive, and shear strength of the components.
3. All mating surfaces shall be accurately formed to ensure proper operation.
4. Gates shall be of the rising stem type unless otherwise noted on the gate schedule or Contract Drawings. Clear butyrate-plastic pipe covers with Mylar position indicators shall be furnished and installed on all rising stems.
5. Gates shall be fabricated in the United States and made of US-forged metals.

B. Aluminum Gates

1. Materials

- a. Gate guide, disc, disc rib reinforcing, stem connector, and yoke shall be ASTM B209 Alloy 6061, ASTM B221 Alloy 6061, or B308 Alloy 6061-T6 aluminum. All parts shall have a minimum thickness of 1/4 inch.
- b. Stem, stem couplings, and fasteners shall be ASTM A276 Type 316 stainless steel.
- c. Stem guides shall be cast iron, bronze bushed, and mounted on cast iron brackets.
- d. Seal system shall be comprised of UHMWPE seals.

2. Disc / Slide

- a. The disc or sliding member shall be of aluminum plate reinforced with structural aluminum extrusions welded to the plate not more than 16 inches apart.
- b. The disc shall not deflect more than 1/360 of the span of the gate under the maximum head.
- c. Reinforcing ribs will extend into the guides so that they overlap the seating surface of the guide.

3. Guides

- a. Guides shall be of extruded aluminum incorporating a dual slot design.

- b. The primary slot shall accept the plate of the disc and the secondary slot shall be sufficiently wide to accept the reinforcing ribs of the disc.
 - c. The guides shall be designed for maximum rigidity and shall have a weight of not less than 3 lbs. per foot. Guides designed for concrete embedment and surface mounting shall have an aluminum angle welded to the lower ends of the guides to form an invert and seating surface for the resilient seal mounted on the disc.
 - d. Guides designed for weir-type slide gates shall extend beneath the opening a sufficient amount to support the disc in the fully down or open position.
4. Stems and Stem Connections - The gate stem shall be connected to the disc by means of a stem connector threaded and bolted to the stem and welded to the disc.

C. Stainless Steel Gates

- 1. General – Stainless steel slide gates shall conform to ANSI/AWWA C561-04, except where modified by this section.
- 2. Materials
 - a. Frames, discs, guides, yokes, stem and stem couplings, stem guide bushings, mounting brackets, rising stem thrust nuts, actuator pedestals, and floorstands shall be Type Type 304/304L or 316/316L stainless steel as designated in the gate schedule. Type 304L and 316L shall be used for all welded components.
 - b. Wall thimbles shall be constructed of the same material as the gate disc unless otherwise indicated in the gate schedule.
 - c. Side seals, invert seals and top seals shall be ultra-high molecular weight polyethylene (UMHWPE) meeting ASTM D4020.
 - d. Flush bottom seals and seats shall be UMHWPE meeting ASTM D4020. Flush bottom seals and seats may also be neoprene meeting ASTM D2000 where indicated in the gate schedule.
 - e. Lift nut and non-rising stem thrust nut shall be bronze meeting ASTM B584 or ASTM B505.
 - f. Gear housing and handwheel or crank shall be cast iron or aluminum.
- 3. Disc
 - a. The disc or sliding member shall have a minimum thickness of 1/4 inch for all members except seal retainers.
 - b. Slide deflection shall not exceed 1/720 of gate width at maximum design head.
- 4. Stems and Stem Connections - The gate stem shall be connected to the disc by a thrust nut or a thru-bolt connection. The stem connection shall prevent rotation of the thrust nut.

- a. Rising stem thrust nuts shall be threaded and keyed or threaded and pinned to the stem.
- b. Non-rising stem thrust nuts shall be threaded but not keyed.

D. Guides and Frames

1. Guides and frames shall have a minimum material thickness of 1/4 inch for all members except seal retainers. Guides shall be integral with frame or bolted to the frame.
2. The disc shall engage the guides for the full length of the disc. Lateral clearance between disc and guides shall permit free travel.
3. Guides shall support at least two thirds of the disc height when the disc is in full open position. Guides shall be of sufficient length to ensure that the gate operates with a smooth, even, uniform movement without jerking, binding or twisting.
4. Frames designed for mounting on the face of concrete shall be provided with a flanged back design and holes for anchor bolts every 12 inches. Frames designed for embedment in concrete shall be provided with keyways to lock into the concrete.
5. Self-contained gate frames shall extend above the disc full-open position or above the top of the wall and shall have structural members welded or bolted between guides to form a yoke to support the gate actuator.

E. Seats and Seals

1. Gate assemblies shall have an integral self-adjusting seat-seal system to restrict leakage as specified and prevent metal to metal contact between the frame and slide. Adjustable wedges, wedging devices, or pressure pads are not permitted.
2. Gates utilizing "J" seals or "P" seals are not acceptable.
3. Seal system shall be of UHMW polyethylene construction.
4. Seats and seals shall be secured to the frame or the disc to ensure they will remain in place, free from distortion or loosening during the life of the gate.
5. Seating-sealing surfaces shall contact their mating surface to meet the leakage requirements specified herein.
6. Seat contact pressure shall not exceed 600 psi at the design head. Top and bottom seat are considered as non-load bearing for this calculation.
7. Where the top of the guide extends to the top of an adjacent wall or bottom of an elevated slab, the gate assembly shall also have a plate or bar mounted at the top of the opening to form a top seat.
8. Flush Bottom Seals
 - a. Where the gate invert level is shown on the Contract Drawings to match the surrounding structure invert elevation, gates shall be flush bottom.
 - b. Flush bottom seals shall meet leakage requirements specified herein.

- c. The flush bottom seal shall be mounted on the disc or the frame and shall be held securely in place, free from distortion or loosening during the life of the gate. When seal is mounted on the disc, a machined stainless steel stop bar shall be bolted and keyed to the frame, forming a flush invert.
- d. The shape of the seal shall produce a seating surface having a minimum width of 3/4 inch and the seal shall extend into the guide.
- e. The vertical face of the seal shall be in contact with the seating surface of the guide to provide a proper seal at the corners.

F. Yokes

- 1. Self-contained gates shall be designed to withstand the thrust of the actuator when 40-lb. effort is placed on the handwheel or crank, with a minimum safety factor of four for ultimate tensile, compressive, and shear strength; and two for yield tensile, compressive, and shear strength.
- 2. Yokes for electric actuators shall be designed for a safety factor of 1.5 with regard to yield strength at the locked-rotor torque of the actuator.
- 3. Yoke deflection should not exceed 1/360 of gate width at maximum operating load.
- 4. The actuator mounting and guide contact surfaces shall be accurately formed to ensure proper stem alignment. The yoke shall be designed to allow removal of the slide from the gate assembly.

G. Stem and Stem Couplings

- 1. Gate stems shall be designed to have a maximum L/r (length/radius of gyration) of 200.
- 2. Threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches.
- 3. Stems, stem couplings, and stem connections shall be designed to withstand the load caused by application of 40-lb. effort on the crank or handwheel with a minimum safety factor of 2, 50-ft/lb. torque on the wrench nut, and 1.25 times the output thrust developed by the motor-locked rotor torque of the electric actuator and meet the minimum safety factor listed herein.
- 4. Stems of more than one section shall be joined by solid stainless steel couplings threaded and bolted or threaded and keyed to the stems. Stem couplings shall be of greater strength than the stems. All threaded and keyed couplings of the same size shall be interchangeable.
- 5. Threads shall be machine cut or rolled American Standard general purpose Acme or stub Acme type. Stem coupling threads and rising stem thrust nut threads may be American Standard general purpose Acme or stub Acme or may be unified screw threads. Where unified screw threads are used the pitch may not be finer than Unified National coarse threading.
- 6. Gates shall be provided with stop collars or other positive means of preventing the gate from operating outside the intended range of disc travel. Stop collars or other approved methods of limiting gate motion shall be field adjusted according to the manufacturer's instructions at the time of gate installation.

H. Stem Guides

1. Stem guides shall be adjustable in two directions and shall be spaced at sufficient intervals to support the stem. Guide spacing shall not exceed 10 feet.
2. Stem guides shall be constructed of stainless steel with UHMWPE bushings.
3. Stem guide brackets may be mounted on the gate guides or yoke or may be mounted on the adjacent structure.
4. Wall-mounted guides shall provide lateral adjustment between the wall and the guide bracket and between the guide bracket and the guide for field alignment.
5. Guides mounted on the gate assembly shall be designed and fabricated to assure proper alignment. The guides shall allow for adjustment to permit proper alignment.
6. Stem guide assemblies and their anchor bolts shall be designed to maintain the alignment under all operating loads.

I. Wall Thimbles

1. Provide wall thimbles for gates where shown on the Contract Drawings or indicated in Table 1 – Equipment Schedule.
2. The minimum material thickness for wall thimbles shall be 1/4 inch.
3. Cross section of wall thimble shall be of a shape to inhibit pullout or seepage. A center ring or water stop shall be cast around the periphery of the thimble.
4. Provisions for pipe attachments shall be made when specified or shown on the Contract Drawings.
5. The front or mounting flange shall be accurately formed to provide a suitable mounting surface and shall be provided with mounting fasteners that mate the gate frame drilling. A permanent gasket of uniform thickness or mastic shall be used to form a seal between the front face of the thimble and back of the gate frame.
6. Gate mounting studs shall be attached by nuts, no thinner than American Standard Finish hex nuts, welded to the back of the thimble or by tapped holes in the thimble.
7. Tapped holes, where used, shall have a minimum thread engagement of one-stud diameter.
8. Holes shall be provided in each entrapment zone formed by the reinforcing ribs, flanges, and waterstops to permit entrapped air to escape. Holes shall be 1.5 inches in diameter and no more than 2 feet apart.
9. Rectangular and square thimbles with an overall width greater than 36 inches shall be provided with holes in the invert to allow satisfactory concrete placement beneath the thimble. Holes shall be on centers of 24 inches or less.

J. Accessories

1. Assembly bolts, studs, nuts, and anchor bolts shall be of size and thickness to meet the minimum safety factors listed herein.

2. Circular flanged-back gates mounting to pipe flanges shall mate with class 25-lb. or class 125-lb. drilling as specified in ANSI/ASME B16.1.
3. Mounting bolts or studs shall be of adequate number and spacing to seal the mounting flange and resist the shearing action caused by operating forces. Where adhesive anchors or expansion anchors are used, the bolt loads shall not exceed the bolt manufacturer's recommendations.

K. Gate Options

1. Self-Contained Gates
 - a. Gates so designated in the schedule or as shown on the Drawings shall have extended guides to allow the gate to fully open.
 - b. The guides shall be sufficiently strong to preclude further reinforcing.
 - c. The yoke shall be fabricated from the guide material and attached to the side guides to form a one-piece rigid frame.
 - d. The yoke shall have a bearing surface for a mounting plate for the operator.
 - e. Construction of the yoke shall allow the disc and stem to be removed without disconnecting the yoke.
 - f. Unless scheduled otherwise, all self-contained slide gates shall be rising stem.

L. Mountings

1. Mounting type shall be specified in the gate schedule based on the following types:

Type	Description
A	Embedded type arranged for concrete embedment
B	Flat back anchor bolt type arranged for upward opening gates mounted on concrete face or surface
C	Spigot back anchor bolt type arranged for upward opening gates mounted on concrete face or surface
D	Flat back anchor bolt type arranged for downward opening weir type gates mounted on concrete face or surface
E	Mounted on wall thimble
F	Mounted on pipe flange
G1	Channel mounted with surface-mounted grouted in frame on sides and invert. See Drawings for special mounting detail
G2	Channel mounted with surface-mounted grouted in frame on side and embedded invert. See Drawings for special mounting detail.

2. Type E shall be further specified by thimble material and style in the gate schedule as follows:
 - a. Type I – F-section wall thimble having a length equal to the wall thickness.
 - b. Type II – E-section wall thimble having a length equal to the wall thickness.

- c. Type III - Flanged-by-mechanical-joint wall thimble. The mechanical-joint portion of the wall thimble shall extend beyond the exterior of the wall a sufficient distance to allow for joint restrainers to be installed as required for the associated pipeline.
 - d. Type IV – Flange-and-Bell wall thimble. Bell portion shall be spigot and of a standard cast iron pipe; Class “B” bells per ASA 21.2 shall be furnished.
 - e. Type V - F-section wall thimble butted to standard flange and bell adaptor for concrete pipe. The wall thimble to adaptor joint shall be made within the concrete wall as shown on the Contract Drawings.
 - f. Type VI - E-section wall thimble butted to standard flange and bell adaptor for concrete pipe. The E-section shall be bolted or clamped to the adaptor as shown on the Contract Drawings. The joint shall be made within the concrete wall.
 - g. Type VII - See Contract Drawings for special mounting details
- 3. Dissimilar metals, such as stainless steel and ductile iron, shall be isolated in accordance with manufacturer recommendations.
 - 4. Provide extra-wide mounts for gates mounted over pipe penetrations.

M. Gate Operators

- 1. General
 - a. Actuators shall be manual as scheduled.
 - b. Actuator shall have a bronze lift nut threaded to fit the operating stem.
 - c. Tapered roller or ball bearings shall be provided above and below the flange on the lift nut to take the thrust developed during gate operation.
 - d. All bearings and gears shall be enclosed in a weatherproof cast iron, ductile iron or aluminum housing, as recommended by manufacturer, with oil seals and O-rings or mechanical seals used to seal the unit.
 - e. Fittings shall be provided so that all bearings and gears can be periodically lubricated.
 - f. Actuator shall be supplied with pedestal, torque tube, or baseplate, machined and drilled for mounting the lift housing and ready for bolting to the operating floor, top wall mounting bracket, or gate yoke, as required.
 - g. The direction of wheel or crank rotation to open the gate shall be indicated on the actuator. Single-speed actuators shall open counterclockwise and two-speed actuators shall open counterclockwise for the low mechanical-advantage gear ratio. Single-speed actuators at the high mechanical advantage gear ratio shall open clockwise.
 - h. All gates 48 inches and wider and having widths greater than twice their height shall be provided with dual stems and with two actuators connected by a tandem shaft for simultaneous operation unless otherwise specified. Cross

shafting shall be stainless steel. Flexible couplings shall be provided at either end of the cross shafting.

- i. Actuator shall be sized to permit slide operation with an effort of not more than 40-lb. pull on the handwheel-hand crank for rising stem or 50-ft/lb. torque on the lift nut input shaft for non-rising stem.
- j. Non-rising stem manual operators shall have a position indicator with a dial or digital display in in full step with gate to show the position of the gate at all times. Indicator dial shall be graduated in 25 percent increments at a minimum. Rising stem manual operators shall have Mylar position indicators shown on the stem cover in 25 percent increments at a minimum.
- k. Each rising stem actuator shall be provided with a stem cover unless otherwise specified. Cover shall be made of clear butyrate-plastic pipe that will not discolor, crack, or become opaque for at least five years after installation.
- l. Floorstands shown on the Contract Drawings or designated in schedule to be mounted on vertical wall shall be provided with a bracket suitable for wall mounting.
- m. Floorstands shown on the Contract Drawings or designated in schedule to be mounted over grated areas, mounting brackets shall be oversized larger than floorstand baseplate with 2-inch clearance on all sides to allow for support of adjacent grating.
- n. Baseplate shall be designed so as not to interfere with any adjacent grating, walls, or any other mechanical equipment.

2. Manual

- a. All actuators shall be supplied with a 2-inch square operating nut, and either a removable cast iron or aluminum crank arm with revolving brass grip or a removable cast iron or aluminum handwheel as scheduled.
- b. Handwheels shall be direct drive type handwheel without reduction gearing. The maximum handwheel diameter shall be 24 inches.
- c. Crank actuators shall be provided with single or double-reduction gearing as necessary to meet lifting capacity.
 - 1) Drive gears used in gear reduction actuators shall be steel and accurately machined, with cut teeth to provide smooth and proper operation.
 - 2) Input shafts shall be stainless steel and supported by tapered roller or other roller-type bearings designed to withstand the radial and thrust loads generated during operation.
 - 3) All geared actuators shall be suitable for operation by use of a portable motor apparatus.
 - 4) The maximum crank radius shall be 15 inches.

2.03 FABRICATION REQUIREMENTS

- A. Surface preparation, shop painting and field painting, and other pertinent detailed painting specifications shall be in accordance with Section 09900.
- B. All bolts, nuts, washers, and other fasteners shall be Type 304 stainless steel unless otherwise noted.
- C. Anchor bolts shall be Type 304 SS HILTI-style epoxy anchors.
- D. Backpaint metals in contact with concrete or masonry with 5 mils of Themec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- E. Isolate dissimilar metals with dielectric using appropriate fasteners.
- F. Welds shall be continuous unless noted otherwise.
- G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- H. Nameplates shall be provided in accordance with Section 01640.
 - 1. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.
 - 2. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings.
- I. Where it does not affect system performance, all sharp edges of equipment shall be rounded with edge grinding or other means to provide satisfactory paint adherence and prevent injury.

PART 3 EXECUTION

3.01 SHOP TESTING

- A. Equipment shall be tested in the manufacturer's shop in accordance with the requirements of Section 01640, Equipment-General, and as specified herein.
 - 1. The gates and operators shall be completely shop assembled and inspected and tested to ensure proper fit and adjustment of all parts.

3.02 EQUIPMENT INSTALLATION

- A. Furnish and install the equipment according to the Contract Documents and the manufacturer's instructions.
- B. Contractor shall field verify all dimensions and elevations and shall notify Engineer of any specific differences.
- C. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for initial operation and testing.

- D. All necessary attaching bolts and anchor bolts shall be ASTM A276 Type 316 stainless steel and shall be furnished by the slide gate manufacturer.
 - 1. All slide gates mounted on concrete faces or walls shall have a mastic seal or gasket provided between the concrete face and guide frame back.

3.03 FIELD TESTING AND INITIAL OPERATION

- A. Functional Testing, System Demonstration Testing, and Startup shall be performed in accordance with this specification section.
- B. All testing shall be done in the presence of the Engineer and the equipment manufacturer or their approved representative.
- C. Functional Test shall consist of the following tests:
 - 1. Verification of compliance with all seating tolerances and leakage requirements. Contractor is responsible for supplying any plugs, pumps, weirs, etc., necessary to conduct the tests, including means to accurately measure the quantity of water leaked.
 - 2. The gate disc shall be fully opened and closed, in the field, to ensure that it operates freely and that the required clearance between the frame and gate guide groove is maintained.
- D. Adjust, repair, modify, or replace any components of the system that fail to meet all specified requirements.

3.04 SERVICE OF MANUFACTURER'S REPRESENTATIVE

- A. Provide services of the equipment manufacturer or their approved representative.

3.05 EQUIPMENT SCHEDULE

- A. All equipment furnished under this Section shall be in accordance with the following equipment schedule.

TABLE 1
EQUIPMENT SCHEDULE

GATE NO.	LOCATION	SIZE OF OPENING (W X H) (IN)	SLIDE HEIGHT (IN)	SLIDE WIDTH (IN)	MOUNTING TYPE	SELF-CONTAINED	GATE MATERIAL	OPERATOR	BOTTOM OF GATE ELEVATION ¹		NOTES
									FULLY RAISED	FULLY LOWERED	
SEE DRAWINGS											
(1) All elevations listed are relative to the NAVD 88 datum. Contractor shall field verify all elevations. (2) Contractor is to field-verify all widths, depths, openings, and conditions for new gate. (3) Provide flush side and invert seal. (4) Bottom elevation of gate to match grouted floor. (5) Provide flush side and invert seal. Provide top seal.											

END OF SECTION