



SOLICITATION FOR:
Narrows Force Main Lining
22-IFB-02-0609

WAREHAM, MASSACHUSETTS

RELEASED: June 9, 2022

DUE BY: June 30, 2022 at 2:00p.m. EST

DELIVER TO:

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

NARROWS PUMP STATION FORCE MAIN LINING

**TOWN OF WAREHAM
WAREHAM, MASSACHUSETTS**

**BIDDING/CONTRACT DOCUMENTS
AND TECHNICAL SPECIFICATIONS**

JUNE 2022

20274B

TOWN OF WAREHAM
WAREHAM, MASSACHUSETTS
BIDDING/CONTRACT DOCUMENTS
AND TECHNICAL SPECIFICATIONS
FOR
NARROWS PUMP STATION FORCE MAIN LINING

JUNE 2022



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SECTION 00102
ADVERTISEMENT FOR BIDS

Town of Wareham
Wareham, Massachusetts
Narrows Pump Station Force Main Lining

General Notice

The Town of Wareham (Owner) is requesting Bids for the construction of the following Project:

Narrows Pump Station Force Main Lining
#22-IFB-02-0609

General Bids for the construction of the Project will be received at the Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, Massachusetts 02571 until June 30, 2022 at 2:00pm, local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

Lining approximately 9,300 linear feet of 16-inch and 18-inch ductile iron force main pipe with a flexible fabric reinforced pipe system from the Narrows Pump Station to the Water Pollution Control Facility (WPCF); interconnections; air release manhole; gooseneck at the WPCF's headworks to create a highpoint in force main; and all appurtenant work to have a complete operational system.

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

www.wareham.ma.us

To be considered a responsive Bidder, the Bidder shall have obtained at least one set of Bidding Documents from the Issuing Office using the name that is to appear on the Bid Form. The designated website will be updated periodically with addenda, lists of plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website. It is the Bidder's responsibility to check the designated website for addenda.

Pre-bid Conference

A pre-bid conference for the Project will be held on June 20, 2022 at 1:00pm at the Wareham Water Pollution Control Facility, 6 Tony's Lane, Wareham, Massachusetts 02571. Attendance at the pre-bid conference is mandatory and bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference.

Instructions to Bidders

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

The bidding and award of this Contract will be under the provisions of M.G.L. Chapter 30, Section 39M. Complete instructions for filing Bids are included in the Instructions to Bidders.

General Bid shall be submitted in accordance with the Instructions to Bidders and shall be accompanied by a Bid Security in the amount of 5 percent of the Bid.

No Bidder may withdraw their Bid for a period of thirty (30) days, excluding Saturdays, Sundays, and legal holidays after the actual date of the opening of the General Bids. This advertisement does not obligate the Owner for any costs associated with preparing or submitting bids.

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

Minimum wage rates as determined by the Executive Office of Labor and Workforce Development, Department of Labor Standards (DLS) under the provisions of M.G.L., Chapter 149, Section 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information on Prevailing Wage Rates for those trades people who may be employed for the proposed work under this contract. The Owner reserves the right to waive any informality in or to reject any or all Bids if deemed to be in its best interest.

END OF SECTION

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions.
- 1.02 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 which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 Deleted
- 2.05 Deleted
- 2.06 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Deleted.
- 3.02 Deleted.
- 3.03 To demonstrate Bidder's qualifications to perform the Work, each Bidder must submit with its bid a completed Experience Statement (Section 00450) and such other data as may be called for below or in the Supplementary Conditions. Each Bid must contain evidence of the Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of contract.
- 3.04 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.05 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.06 To be considered a responsive Bidder, the Contractor shall have obtained at least one set of Bidding Documents from the Issuing Office. The Bid will not be awarded to a Bidder unless a record for obtaining at least one set of Bidding Documents exists in the Issuing Office. To meet this requirement and to establish the record of receipt, a prospective Bidder must obtain Bidding Documents using the name that is to appear on the Bid Form.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Proposals will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of qualified Bidders that attended the pre-bid conference and are eligible to submit a Bid for this Project will be issued in an Addendum.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from

discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

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

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled immediately following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.
- C. Bidders visiting the Site are required to arrange their own transportation to the Site.
- D. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: Guy Campinha, Director of Water Pollution Control, (508) 295-6144. Bidder must conduct the required Site visit during normal working hours.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- G. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- H. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS**6.01** *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
- A. Michael Stein, PE, Senior Project Manager, Wright-Pierce, Michael.Stein@wright-pierce.com.
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven working days prior to the date for opening of Bids may not be answered. Addenda will be issued not later than five working days before the bid opening. Bidders are responsible for determining that they have received all Addenda issued.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

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 (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents. Bid security must be at least 5% of the Bidder's maximum Bid price.
- 8.02 All Bid Securities of General Bidders except those of the three lowest responsible and eligible General Bidders will be returned within five days, Saturdays, Sundays, and legal holidays excluded, after opening of the General Bids. The Bid security of the three lowest Bidders will be retained until the successful Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award. 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 annul the Notice of Award and the Bid security of that Bidder will be forfeited to the OWNER as liquidated damage. The amount forfeited to OWNER shall not exceed the difference between the Bid Price of said Bidder and that of the next lowest responsible and eligible bidder and provided further that,

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in case of death, disability, or other unforeseen circumstances affecting the Bidder, such Bid Security may be returned to the Bidder.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 Deleted.
- 9.03 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND “OR EQUAL” ITEMS

- 10.01 The Contract, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents. Procurement standards under M.G.L. Chapter 30, Section 39M requires specifications be written for competitive bidding by at least three (3) manufacturers or suppliers for each item of material to be furnished under the contract. If three manufacturers or suppliers are not listed, then 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 Owner or Engineer until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by Engineer is set forth in the General Conditions and may be supplemented in the General Requirements.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.
- 10.03 Wherever it is written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure. Such bond shall be an Efficiency Guarantee Bond executed on a form to be approved by the OWNER.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid. If requested by Owner, the apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed.
- 11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable

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objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

- 11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. ~~If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."~~
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum with Unit Prices and Alternates*

- A. Bidders must submit a Bid on a lump sum basis for each lump sum item, and on a unit price basis for each unit price item of Work listed in the Bid Form for the base Bid and include a separate price for each alternate described in the Bidding Documents and 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.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- D. The total of all unit price "Bid Prices" and all lump sum items will be used by Owner for Bid comparison purposes.

13.02 *Allowances*

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

ARTICLE 14—SUBMITTAL OF BID

- 14.01 Deleted.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

is submitted, the name and address of Bidder, and must 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 must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.

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

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 ~~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, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the 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 also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether 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.
 - B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a “Base Bid plus alternates” budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
 - C. Deleted.
 - D. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
 - E. Deleted.
 - F. Deleted.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.
- 18.08 In accordance with Massachusetts General Law Chapter 149, Section 44E(3), after opening of sub-bids, the OWNER will reject every sub-bid which is not accompanied by the required bid deposit or which otherwise does not conform to the statutory requirements, or which is on a form that is not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for; provided, however, that the failure of the OWNER to reject such a sub-bid within such period shall not validate such a sub-bid nor preclude the OWNER from subsequently rejecting it.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds, other required bonds (if

any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 5 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—SALES AND USE TAXES

- 21.01 Owner is exempt from Massachusetts state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.
- 21.02 Section 6(f) of Chapter 64 H of the Massachusetts General Laws exempts building materials and supplies to be used in the project from Massachusetts sales tax, and bidders shall not include in their bids any amount therefore. The words “building materials and supplies” shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge or other such public work project, as well as such material and supplies physically incorporated therein. Said words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the site of the project or while being used exclusively for the transportation of materials for the project. Refer to Paragraph 7.09 of the Supplementary Conditions for additional information.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

ARTICLE 23—DELETION OF ITEMS

- 23.01 Owner reserves the right to reduce project scope by the elimination of Bid items, reduction of quantities on unit price Bid items, or deleting elements of lump sum Bid items. No adjustment to other Bid items prices will be permitted. In the case of reduction of quantities on unit price items, the unit price will not be adjusted. Such adjustments to project scope will be determined prior to award of the Contract and will be negotiated with the apparent Successful Bidder only. If such negotiations are not satisfactory to Owner, Owner will reject all Bids.

ARTICLE 24—FEDERAL REQUIREMENTS

Deleted

ARTICLE 25—SPECIAL LEGAL REQUIREMENTS

- 25.01 Applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply.
- 25.02 Minimum Wage Rates as determined by the Executive Office of Labor and Workforce Development, Department of Labor Standards (DLS) 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. The State schedule of minimum wage rates is included in the Supplementary Conditions.
- 25.03 The contractor guarantees that the Work and Services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other contract documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this AGREEMENT titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.
- 25.04 24.04 If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the contractor in writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, corrections or replacements to the satisfaction of the Owner within seven (7) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make said repairs, correction or replacements, and charge the costs, including compensation for additional professional services, to the Contractor.
- 25.05 Safety:
- A. This project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety 'Rules and Regulations for the Prevention of Accidents in Construction Operations' (Chapter 454 CMR 10.00 et seq.). Contractors shall be familiar with the requirements of these regulations.
 - B. Safety provisions for confined space entry shall follow General Industry Standard CFR Title 29 Part 1910.146.
 - C. The Successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

- D. The Successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act on the Site to inspect the Work and to supervise the conformance of the Work with the regulations of the Act.
- 25.06 No work, including the startup of equipment, shall be performed before the hour of 7:00 a.m. and after the hour of 5:00 p.m. on weekdays, or on Saturdays or Sundays.
- 25.07 Additional Massachusetts Requirements:
- A. Representatives of the Commonwealth, the EPA, and any local agencies having a direct interest in the Work shall have access to the Work under this contract wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and inspection.
 - B. Pursuant to Section 49A of Chapter 62C of the Massachusetts General Laws, the CONTRACTOR must certify that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes.
 - C. Pursuant to Section 39R of Chapter 30 of the Massachusetts General Laws, the Contract Documents require the GENERAL CONTRACTOR to make and keep books, records and accounts pertaining to the CONTRACTOR's financial affairs and to file with DCAMM and the OWNER the statements and certificates described in said Section 39R. Records and statements required under Section 39R are not public records and are not open to public inspection, but shall be made available as provided in said Section 39R.

END OF SECTION

SECTION 00412

TOWN OF WAREHAM, WAREHAM, MASSACHUSETTS
NARROWS PUMP STATION FORCE MAIN LINING

The following Bid is submitted to: Town of Wareham-Water Pollution Control Facility
6 Tony's Lane
Wareham, Massachusetts 02571

By (Contractor Name): _____
(Address for Giving Notice): _____

(Telephone): _____
(FAX): _____

- A. The Undersigned proposes to furnish all labor and materials required for NARROWS PUMP STATION FORCE MAIN LINING in Wareham, Massachusetts, in accordance with the accompanying plans and specifications prepared by Wright-Pierce for the contract price specified below, subject to additions and deductions according to the terms of the specifications.
- B. This bid includes addenda (contractor to fill in Addendum number and date issued as acknowledgement of receipt)

Number _____
Date Issued _____

- C. The proposed contract price for the Base Bid including Bid Items 1 and 23 complete is

_____ dollars (\$_____).
(in Words) (in Figures)

For alternate No. 1 Add (\$_____).
(in Figures)

- D. The subdivision of the proposed contract price is as follows:

Item No.	Base Bid Description	Unit	Quantity	Bid Unit Price	Bid Amount
1	Mobilization/Demobilization (5%)	LS	1		
2	Erosion and Sedimentation Control	LS	1		
3	Traffic Management	LS	1		
4	Test Pits	EA	6		
5	Excavation Dewatering	LS	1		
6	Dewatering, Cleaning, and Inspections of Existing Force Main	LS	1		
7	Force Main Lining, inclusive of parts and labor	LS	1		
8	Post Lining Installation CCTV Inspection	LS	1		
9	Post-Installation Liner Hydrotest	LS	1		
10	Excavation Pits for Lining	LS	1		
11	Air/Vacuum Release Manhole	LS	1		
12	16-inch connector sets, additional	EA	2		
13	18-inch connector sets, additional	EA	2		
14	Ledge Excavation	CY	10*		
15	Flowable (Controlled Density) Fill	CY	160*		
16	Initial Pavement (2")	TON	10*		
17	Final Pavement (Sandwich Rd)	TON	3*		
18	Driveway Bituminous Pavement	TON	4*		
19	Bituminous Sidewalk	TON	5*		
20	Granite Curb, Remove and Reset	LF	120*		
21	Concrete Sidewalk	SY	150*		
22	Loam and Seed	SY	270*		
23	Utility Relocation	ALLOW	1	\$10,000	
24	Disposal of Contaminated Materials	ALLOW	1	\$10,000	
25	Uniformed Police Detail Allowance	ALLOW	1	\$20,000	
26	Price Adjustments	ALLOW	1	\$10,000	
Total Base Bid Items 1 - 26					\$
Item No.	Alternate 1 Description	Unit	Quantity	Bid Unit Price	Bid Amount
27	Temporary Force Main Bypass System	LS	1		
Total Alternate Item 27					\$

* Indeterminate quantities assumed for comparison of bids. Quantities are not guaranteed. Payment will be based on actual quantities constructed.

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

The undersigned declares that the only persons or parties interested in this Bid as principals

are as stated; that all the Contract Documents as prepared by Wright-Pierce, 600 Federal Street, Suite 2151, Andover, MA 01810 and dated June 2022 have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in performing the Work required under the Contract Documents, of which this Form for General Bid is a part.

The Bid Security accompanying this Bid shall be in the amount of 5 percent of the Bid. The Bid Security shall be sealed in a separate envelope from the Bid and then attached to the envelope containing the Bid.

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

The undersigned hereby agrees that the Contract Time shall commence twenty days following the Effective Date of the Agreement and that the Work will be substantially complete and completed and ready for final payment in accordance with paragraph 15.06 of the General and Supplementary Conditions on or before the dates or within the number of calendar days indicated in the Agreement. The undersigned further understands that delays in completion of the Work will cause the OWNER to suffer damages and incur substantial costs, and will expose the OWNER to other substantial liabilities, and that if the selected Contractor shall neglect, fail or refuse to achieve Substantial Completion or final completion of the Work within the times specified above, as such times may be extended pursuant to the provisions of the Contract Documents, the OWNER will hold the selected Contractor strictly liable for all such damages and any other damages, costs, expenses or liabilities sustained or incurred by the OWNER arising out of such delays, as further provided in the Agreement, or for any delay in achieving any other milestones set forth in the Contract Documents in accordance with the terms of the Agreement.

In accordance with the above understanding, the undersigned proposes to perform the Work, furnish all materials and complete the work in its entirety in the manner and under the conditions required.

The OWNER shall select the low responsive and responsible bidder based on the Base Bid plus Alternate 1 and available funding. To be considered responsive, Bidder shall submit bids for the Base Bid and Alternate 1. The OWNER reserves the reject Alternate 1 and supply

work with OWNER resources, but Bid plus Alternate 1 will be considered in selecting the low responsive and responsible bidder.

The bidding and award of this Contract will be in accordance with M.G.L. Chapter 30, Sections 39M.

The undersigned must furnish a 100 percent Performance Bond and a 100 percent Payment Bond with a surety company acceptable to OWNER.

Where indicated for amounts to be shown in both words and figures, in case of discrepancy, the amount shown in words shall govern.

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

- (a) Bid Security (Section 00430 - Bid Bond)
- (b) Experience Statement (Section 00450)
- (c) Certificate of Authority to Sign
- (d) Installer certification from manufacturer

SIGNATURE PAGE FOR CERTIFICATION STATEMENTS

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

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

The undersigned certifies under penalties of perjury that there have been no substantial changes in his financial position or business organization other than those changes noted within the application since the applicant's most recent pre-qualification statement and that the bid is in all respects bonafide, fair and made without collusion or fraud with any other person.

“Person” shall mean any natural person, joint venture, partnership, corporation or other business or legal entity which sells materials, equipment or supplies used in or for, or engages in the performance of, the same or similar construction, reconstruction, installation, demolition, maintenance or repair work or any part thereof.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-nine F of Chapter Twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

SIGNATURES FOR INDIVIDUAL OR CORPORATION

_____ Social Security Number or Federal Identification Number	_____ Individual or Corporate Name (Print or Type)	_____ Signature of Authorized Person
---	--	---

SIGNATURES FOR PARTNERSHIP OR JOINT VENTURE (use as many lines as necessary)

_____ Social Security Number or Federal Identification Number	_____ Individual or Corporate Name (Print or Type)	_____ Signature of Authorized Person
---	--	---

_____ Social Security Number or Federal Identification Number	_____ Individual or Corporate Name (Print or Type)	_____ Signature of Authorized Person
---	--	---

_____ Social Security Number or Federal Identification Number	_____ Individual or Corporate Name (Print or Type)	_____ Signature of Authorized Person
---	--	---

SIGNATURE PAGE FOR BID

RESPECTFULLY SUBMITTED on _____, 20__

An Individual: By (Individual's Signature) _____ (SEAL)

(Print Individual's Name) _____
doing business as _____
Business address: _____

A Partnership: By (Authorized Signature) _____ (SEAL)
(Print Partner's and Firm Name) _____
Business address: _____

A Corporation: By (Authorized Signature) _____ (Corporate Seal)
(Print Name and Title of Person Authorized to Sign) _____
(Corporation Name) _____
(State of Incorporation) _____
Attest (Secretary) _____
Business address: _____

A Joint Venture
By (Authorized Signature) _____ (SEAL)
Business address: _____

By (Authorized Signature) _____ (SEAL)
Business address: _____

By (Authorized Signature) _____ (SEAL)
Business address: _____

(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).

PROVIDE CERTIFICATE OF AUTHORITY TO SIGN

SECTION 00414

CERTIFICATE OF AUTHORITY TO SIGN

At a duly authorized meeting of the Board of Directors of _____

(Company Name)

held on _____, at which all the Directors were present or waived notice, it was
voted (Date)

that _____, _____, _____
(Officer Names)

of this Company, be and he/she/they hereby is/are authorized to execute Bidding Document,

Contracts and Bonds in the name and on behalf of said Company, and affix its corporate seal
thereto,

and such execution of any contract or obligation in this Company's name on its behalf by such

_____ under seal of the Company shall be valid and binding upon this Company.
(Officer/Title)

I hereby certify that the above vote has not been amended or rescinded and remains in full effect
as of

this date _____.

A true copy,

ATTEST _____
Clerk

(Corporate Seal)

(General Bidders and Sub-Bidders shall complete and submit this Form or a similar Form as proof of Authority to Sign)

SECTION 00430BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address (<i>principal place of business</i>): [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address (<i>principal place of business</i>): [Address of Owner's principal place of business]	Bid Project (<i>name and location</i>): [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due]
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____	_____
(<i>Full formal name of Bidder</i>)	(<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____	By: _____
(<i>Signature</i>)	(<i>Signature</i>) (<i>Attach Power of Attorney</i>)
Name: _____	Name: _____
(<i>Printed or typed</i>)	(<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____	Attest: _____
(<i>Signature</i>)	(<i>Signature</i>)
Name: _____	Name: _____
(<i>Printed or typed</i>)	(<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Note: Addresses are to be used for giving any required notice. (2) 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 will be Owner's sole and exclusive remedy upon default of Bidder.

EJCDC® C-430, Bid Bond (Penal Sum Form).

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2. Default of Bidder occurs 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 will 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 does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must 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 Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will 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 will 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 governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

SECTION 00450QUALIFICATIONS STATEMENT**ARTICLE 1—GENERAL INFORMATION**

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation		
<input type="checkbox"/> Limited Liability Company <input type="checkbox"/> Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Pending	
Identify all		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

1.03 Provide information regarding the Business’s officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Limit of Authority:	\$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business’s Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned Business		
<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		
<input type="checkbox"/> Other		
<input type="checkbox"/> None		

ARTICLE 4—SAFETY

4.01 Provide information regarding Business’s safety organization and safety performance.

Name of Business’s Safety Officer:			
Safety Certifications			
Certification Name	Issuing Agency	Expiration	

4.02 Provide Worker’s Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business’s financial stability. If required in the “Submit” check box below, provide a copy of the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business’s most recent financial statement:		<input type="checkbox"/> Submit	
Date of Business’s most recent audited financial statement:		<input type="checkbox"/> Submit	
Financial indicators from the most recent financial statement			
Contractor’s Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor’s Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider	Type of Policy (Coverage Provided)		
Are providers licensed or authorized to issue policies in the Project location?			<input type="checkbox"/> Yes <input type="checkbox"/> No
Does provider have an A.M. Best Rating of A-VII or better?			<input type="checkbox"/> Yes <input type="checkbox"/> No
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business’s previous contracting experience.

Years of experience with projects like the proposed project:		
As a general contractor:		As a joint venturer:
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:		
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been barred from contracting by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been released from a bid in the past 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Defaulted on a project or failed to complete any contract awarded to it? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Refused to construct or refused to provide materials defined in the contract documents or in a change order? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been a party to any currently pending litigation or arbitration? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Provide full details in a separate attachment if the response to any of these questions is Yes.		

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business’s experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business’s key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business’s safety performance if required by Paragraph 4.02.
- D. Financial statements as required by Paragraph 5.01.

- E. Attachments providing additional information as required by Paragraph 8.02.
- F. Schedule A (Current Projects) as required by Paragraph 8.03.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:
Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

Schedule A—Current Projects

Name of Organization		Project Name	
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Owner		Email	
Designer			
Construction Manager			

Project Owner		Project Name	
General Description of Project		Project Name	
Project Cost			
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Owner		Email	
Designer			
Construction Manager			

Project Owner		Project Name	
General Description of Project		Project Name	
Project Cost			
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Owner		Email	
Designer			
Construction Manager			

Schedule B—Previous Experience with Similar Projects

Name of Organization		Project Name	
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Organization	
Title/Position		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			

Schedule B—Previous Experience with Similar Projects

Name of Organization		Project Name	
Project Owner		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Title/Position	
Organization		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Title/Position	
Organization		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Title/Position	
Organization		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			
Project Owner			
Project Name		Project Name	
General Description of Project			
Project Cost		Date Project	
Key Project Personnel		Project Superintendent	
Name		Safety Manager	
Quality Control Manager		Quality Control Manager	
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Title/Position	
Organization		Telephone	
Email		Email	
Owner			
Designer			
Construction Manager			

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

END OF SECTION

SECTION 00510NOTICE OF AWARD

Date of Issuance:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Project:

Contract Name:

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[Describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is \$**[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

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 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: **[Full formal name of Owner]**By (*signature*): _____Name (*printed*): _____

Title: _____

Copy: Engineer

END OF SECTION

SECTION 00520AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **Town of Wareham, Massachusetts** (“Owner”) and **[name of contracting entity]** (“Contractor”).

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

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: Lining approximately 9,300 linear feet of 16-inch and 18-inch ductile iron force main pipe with a flexible fabric reinforced pipe system from the Narrows Pump Station to the Water Pollution Control Facility (WPCF); interconnections; air release manhole; gooseneck at the WPCF’s headworks to create a highpoint in force main; and all appurtenant work to have a complete operational system.

ARTICLE 2—THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Narrows Pump Station Force Main Lining**

ARTICLE 3—ENGINEER

- 3.01 The Owner has retained **Wright-Pierce** (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.
- 3.02 The part of the Project that pertains to the Work has been designed by **Wright-Pierce**.

ARTICLE 4—CONTRACT TIMES

- 4.01 *Time is 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 *Contract Times: Dates*
- A. n/a
- 4.03 *Contract Times: Days*
- A. The Work will be substantially complete within **180** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **210** days after the date when the Contract Times commence to run.

4.04 *Milestones - Deleted*4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion:* Contractor shall pay Owner \$1,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,000 for each day that expires after such time until the Work is completed and ready for final payment.
 3. *Milestones:* Contractor shall pay Owner \$1,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.
 4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.
- C. *Bonus - Deleted*

4.06 *Special Damages – Deleted.***ARTICLE 5—CONTRACT PRICE**

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- 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 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the last day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. 95 percent of the value of the Work completed (with the balance being retainage).
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion of the entire construction to be provided under the Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to 98 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.
1. The final 2 percent of the value of the Work shall be retained for a period of one year from the date of Substantial Completion.

6.04 *Consent of Surety*

- A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of prime plus 2 percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS7.01 *Contents*

- A. The Contract Documents consist of all of the following:
1. This Agreement.
 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 6. Drawings (not attached but incorporated by reference) consisting of **[number]** sheets with each sheet bearing the following general title: **[title on Drawings]**.
 7. Addenda (numbers **[number]** to **[number]**, inclusive).
 8. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid
 - b. **[list exhibits]**
 9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.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 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 8. 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.
 9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

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

8.02 *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 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.-

8.04 *Other Provisions*

- A. N/A

AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

Contractor:

(typed or printed name of organization)

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Address for giving notices:

Designated Representative:

Designated Representative:

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Address:

Phone: _____

Phone: _____

Email: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

License No.: _____
(where applicable)

State: _____

END OF SECTION

SECTION 00550NOTICE TO PROCEED

Owner: _____ Owner's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Project: _____
 Contract Name: _____
 Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

[or]

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: Town of Wareham, Massachusetts

By (signature): _____

Name (printed): _____

Title: _____

Date Issued: _____

Copy: Engineer

END OF SECTION

SECTION 00610PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address (<i>principal place of business</i>): [Address of Owner's principal place of business]	Contract Description (<i>name and location</i>): [Owner's project/contract name, and location of the project] Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] (<i>Date of Bond cannot be earlier than Effective Date of Contract</i>) Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ (<i>Full formal name of Contractor</i>)	_____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ (<i>Signature</i>)	By: _____ (<i>Signature</i>)(<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
- 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
- 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
- 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

END OF SECTION

SECTION 00615

PAYMENT BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address <i>(principal place of business)</i>: [Address of Contractor’s principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address <i>(principal place of business)</i>: [Address of Surety’s principal place of business]</p>
<p>Owner</p> <p>Name: [Full formal name of Owner]</p> <p>Mailing address <i>(principal place of business)</i>: [Address of Owner’s principal place of business]</p>	<p>Contract</p> <p>Description <i>(name and location)</i>: [Owner’s project/contract name, and location of the project]</p> <p>Contract Price: [Amount, from Contract]</p> <p>Effective Date of Contract: [Date, from Contract]</p>
<p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

END OF SECTION

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.

APPLICATION FOR PAYMENT

Prepared By



Endorsed By



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Contractor's Application for Payment

Owner: _____	Owner's Project No.: _____
Engineer: _____	Engineer's Project No.: _____
Contractor: _____	Contractor's Project No.: _____
Project: _____	
Contract: _____	
Application No.: _____	Application Date: _____
Application Period: From _____ to _____	

1. Original Contract Price	\$	-
2. Net change by Change Orders	\$	-
3. Current Contract Price (Line 1 + Line 2)	\$	-
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-
5. Retainage		
a. _____ X \$ - Work Completed	\$	-
b. _____ X \$ - Stored Materials	\$	-
c. Total Retainage (Line 5.a + Line 5.b)	\$	-
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application	\$	-
9. Balance to finish, including retainage (Line 3 - Line 4)	\$	-

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(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 the Work covered by prior Applications for Payment;

(2) Title to 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 the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

Recommended by Engineer	Approved by Owner
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____
Approved by Funding Agency	
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *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.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *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.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *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 of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents;
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. 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 Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *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 the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will 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.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

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

4.04 *Progress Schedule*

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

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

- Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
 - F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
 - G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
 - H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
 - I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
 - J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
 - K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is 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; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. 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 all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *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 maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will 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 must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

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

Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

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

7.10 *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.

7.11 *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. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *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.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. 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.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

- H. 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.
- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.
 3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.
 5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
 8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.
- D. *Resubmittal Procedures for Shop Drawings and Samples*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
 2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
 3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.
- E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*
1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

- c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.
 - d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, 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.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or
 9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.
- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. 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.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

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

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price

will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

- 9.04 *Pay When Due*
- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.
- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will 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 Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of 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, 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.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on 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, must cease to accrue when the use thereof is no longer necessary for the changed 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

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

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. 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.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

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

13.03 Unit Price Work

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

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

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

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction 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 with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

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

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

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

14.03 *Defective Work*

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

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 Contractor's Warranty of Title

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. 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.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

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

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

CONTENTS OF SUPPLEMENTARY CONDITIONS

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ARTICLE 1—DEFINITIONS AND TERMINOLOGY**1.01 Defined Terms****SC-1.01.A.3 APPLICATION FOR PAYMENT**

Add the following language to the end of Paragraph 1.01.A.3:

The Application for Payment form to be used on this Project is EJCDC No. C-620 or similar approved format.

SC-1.01.A.8 CHANGE ORDER

Add the following language to the end of Paragraph 1.01.A.8: The Change Order form to be used on this Project is the modified version of EJCDC No. C-941 provided in these specifications.

SC-1.01 A.30 OWNER

Add the following to the end of Paragraph 1.01.A.30 of the General Conditions:

Owner is referred to as Grantee in certain sections of these Contract Documents. Owner and Grantee are one and the same.

SC-1.01 A.50 WORK CHANGE DIRECTIVE

Add the following language at the end of the last sentence of Paragraph 1.01.A.50

The Work Change Directive form to be used on this Project is EJCDC C-940 (2018). A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

SC-1.01 A.53 NON-RESIDENT CONTRACTOR

Add the following paragraph immediately after Paragraph 1.01.A.52 of the General Conditions, which is to read as follows:

53. Non-Resident Contractor -
- a. A person who is not a resident in the State where the proposed construction is to be located, or
 - b. Any partnership that has no member thereof resident in the State where the proposed construction is to be located.
 - c. Any corporation established under laws other than those of the State in which the proposed construction is located.

ARTICLE 2—PRELIMINARY MATTERS**2.01 Delivery of Bonds and Evidence of Insurance**

Add a new paragraph immediately after Paragraph 2.01.C of the General Conditions, which is to read as follows:

- D. *Non-Resident Contractor:* The Contractor, if a corporation established under laws other than the State in which the proposed construction is located, shall file with the Owner, notice of the name of its resident attorney, appointed as required by the laws of the State in which the proposed construction is located. The Contractor, if a resident of a State other than that in which the proposed construction is located and not a corporation, shall

file, at the time of execution of the Agreement, with the Owner a written appointment of a resident of the State in which the construction is located, having an office or place of business therein, to be his/her true and lawful attorney upon whom all lawful processes in any actions or proceedings against him/her may be served; and in such writing, which shall set forth said attorney's place of residence, shall agree that any lawful process against him/her which is served on said attorney shall be of the same legal force and validity as if served on him/her and that the authority shall continue in force so long as any liability remains outstanding against him/her in said State. The power of attorney shall be filed in the office of the Secretary of State if required, and copies certified by the Secretary shall be sufficient evidence thereof. Such appointment shall continue in force until revoked by an instrument in writing, designating in a like manner some other person upon whom such processes may be served, which instrument shall be filed in the manner provided herein for the original appointment.

2.02 *Copies of Documents*

SC-2.02 Delete Paragraph 2.02.A. in its entirety and replace with the following paragraph:

Owner shall furnish to Contractor three printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional copies will be furnished upon request at the cost of reproduction.

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

B. *Electronic Documents Protocol*: The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. *Basic Requirements*

- a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
- b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
- c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.
- d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

- e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.
 - f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.
2. *System Infrastructure for Electronic Document Exchange*
- a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.
 - 1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 10 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.
 - 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.
 - b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
 - c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.
 - d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the

changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

- e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.
- f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
- g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.
- h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:
 - 1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
 - 2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;
 - 3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and
 - 4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.

C. Software Requirements for Electronic Document Exchange; Limitations

- 1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.
 - a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first

EJCDC® C-800, Supplementary Conditions of the Construction Contract.

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notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.

2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No changes in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

SC-4.01 Delete Paragraph 4.01.A in its entirety and insert the following in its place:

- A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be issued at any time within 30 calendar days after the Effective Date of the Agreement.

4.03 Reference Points

SC-4.03 B. Engineer may check the lines, elevations, reference marks, batter boards, etc., set by Contractor, and Contractor shall correct any errors disclosed by such check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate construction of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades.

4.05 Delays in Contractor's Progress

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*
 - a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered abnormal weather conditions. Requests for time extensions due to abnormal weather conditions will be submitted to the Engineer within five days of the end of the abnormal weather condition event.

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
		none

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
		none

- G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents during regular business hours, or may request copies from Engineer.

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
		none

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
		none

Drawings Title	Date of Drawings	Technical Data

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

6.03 *Contractor's Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: Engineer's Consultants, as specifically identified in Article 1
- E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	\$ n/a
Bodily injury by disease—aggregate	\$ n/a
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$ n/a

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.
5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
6. Any limitation or exclusion based on the nature of Contractor's work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

- J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000

- K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$5,000,000
General Aggregate	\$5,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or

excess policy must retain a minimum limit of \$5,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.

- M. *Contractor's Pollution Liability Insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$5,000,000
General Aggregate	\$5,000,000

SC-6.06 Receipt and Application of Property Insurance Proceeds

Delete Article 6.06 in its entirety.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Delete Paragraph 7.03.C in its entirety, and insert the following:

- C. In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.

SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:

- D. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

7.05 *"Or Equals"*

SC-7.05 Add a new subparagraph SC-7.05.A.2 immediately after subparagraph 7.05.A.1.b.2:

2. Procurement standards under Massachusetts General Law Chapter 30, Section 39M requires specifications be written for competitive bidding by at least three (3) manufacturers or suppliers for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request. The Town of Wareham has established the need to sole source certain items. The affected items are as follows: Flexible Fabric Reinforced Pipe System as noted in Specification 02699.

Add the following at the end of Paragraph 7.05.B

Contractor shall include a Manufacturer's Certification letter for compliance with American Iron and Steel requirements in support data, if applicable. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

Add a new subparagraph SC-7.05.B.1 immediately after subparagraph 7.05.B:

1. It shall be Contractor's responsibility to coordinate all submittals to Engineer for approval to eliminate any conflicts which might arise due to the use of "or equal" items. Any additional costs incidental to the use of "or equal" items shall be paid by Contractor.

7.06 *Substitutes*

SC-7.06 Add a new subparagraph SC-7.06.E.1 immediately after subparagraph 7.06.E:

1. It shall be Contractor's responsibility to coordinate all submittals to Engineer for approval to eliminate any conflicts which might arise due to the use of substitutes. Any additional costs incidental to the use of substitutes shall be paid by Contractor.

7.07 *Concerning Subcontractors and Suppliers*

Add the following language at the end of Paragraph 7.07.L of the General Conditions:

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

Add the following subparagraphs immediately after subparagraph 7.07.M:

- N. Contractor shall make payments to Subcontractors in accordance with Massachusetts General Law Chapter 30, Section 39F.
- O. The Contractor shall not award work valued at more than fifty (50%) percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.09 *Permits*

Add the following subparagraph immediately after Paragraph 7.09.A:1. Local permit fees for permits required from the Town of Wareham will be waived.

Add the following paragraph immediately after Paragraph 7.09.A:

- B. The following permits/approvals have been or will be obtained by the Owner. Full copies of the permit applications and approvals will be on file at the Owner's offices. It is the responsibility of the Contractor to be familiar with and comply with the applicable provisions of each permit as they apply to the work:
 1. *Massachusetts Department of Transportation (MassDOT) Highway Opening Permit*
 2. *Town of Wareham Conservation Commission*

7.10 *Taxes*

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

- B. Section 6(f) of Chapter 64 H of the Massachusetts General Laws exempts from Massachusetts sales tax building materials and supplies to be used in the project, and bidders shall not include in their bids any amount therefore. The words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge or other such public work, as well as such material and supplies physically incorporated therein. Said words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the site of the project or while being used exclusively for the transportation of materials for the project.

SC-7.17 Contractor's General Warranty and Guarantee

Add new paragraphs immediately after Paragraph 7.17.E:

- F. CONTRACTOR shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Substantial Completion. CONTRACTOR warrants and guarantees for a period of one (1) year from the date of Substantial Completion of the systems that the completed systems are free from all defects due to faulty materials or workmanship and CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. OWNER will give notice of observed defects with reasonable promptness. In the event that CONTRACTOR should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, OWNER may do so and charge CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period."
- G. The Performance Bond shall remain in full force and effect through the guarantee period.

SC 7.20 Contractor's Records

Add a new paragraph immediately after paragraph 7.19 of the General Conditions which is to read as follows:

7.20 Definitions; Contract Provisions; Management and Financial Statement; Enforcement

- A. CONTRACTOR shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding CONTRACTOR's records.

ARTICLE 8—OTHER WORK AT THE SITE

SC-8.02 COORDINATION

Add the following new Paragraph 8.02.C immediately after Paragraph 8.02.B:

- C. Owner intends to contract with others for the performance of other work at or adjacent to the Site.
1. Owner shall have authority and responsibility for coordination of the various contractors and work forces at the Site;

2. The specific matters are to be covered by such authority and responsibility: work at the WPCF site.

ARTICLE 9—OWNER’S RESPONSIBILITIES

No changes in this Article.

ARTICLE 10—ENGINEER’S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraph immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
 1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor’s safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR’s own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner’s liaison with Contractor when Contractor’s operations affect Owner’s on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor’s proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

- b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
- 6. *Payment Requests: Review Applications for Payment with Contractor.*
- 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - 7. Authorize Owner to occupy the Project in whole or in part.

10.06 DECISIONS ON REQUIREMENTS OF CONTRACT DOCUMENTS AND ACCEPTABILITY OF WORK.

SC-10.06 Add the following new paragraph after Paragraph 10.06.A:

B. ENGINEER'S interpretations will be made in accordance with Massachusetts General Law Chapter 30, Section 39P.

ARTICLE 11—CHANGES TO THE CONTRACT

No changes to this Article.

ARTICLE 12—CLAIMS

No changes to this Article.

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK**13.01 Cost of the Work**

SC-13.01 Add a new paragraph immediately after Paragraph 13.01.B.1, of the General Conditions which is to read as follows:

- a. Contractor shall establish, in the Agreement, the Direct Labor Cost percentage. This percentage, where approved by Owner, will be used in the determination of the Direct Labor Cost listed in the Change Order Form. The Direct Labor Costs are defined to include the following (table to be completed/submitted prior to the first change order):

Payroll Taxes	Percent
Federal Insurance Contributions Act (FICA) – Social Security	6.200
Federal Insurance Contributions Act (FICA) – Medicare	1.450
Federal Unemployment Tax Act (FUTA)	
State Unemployment Tax Act (SUTA)	
State Disability Insurance (SDI)	
Qualifying Insurance	
Worker’s Compensation	
General Liability	
Umbrella	
Other Qualifying Insurance	
Fringe Benefits	
Holiday	
Vacation	
Sick	
Health Insurance	
Life Insurance	
Long-term Disability	
Short-term Disability	
Dental	
Pension/401K	
Total Direct Labor Markup	

SC-13.01 Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of: Blue Book Rates from Equipment Watch™, with location adjustments for the area of the Project.

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

- a. For purposes of this paragraph, “small tools and hand tools” means any tool or equipment whose current price if it were purchased new at retail would be less than \$500.

13.02 *Allowances*

SC13.03 Delete Paragraphs 13.02.A, B, C and D in their entirety.

13.03 UNIT PRICE WORK

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 20 percent from the estimated quantity of such item indicated in the Agreement.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

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

SC 14.07 Owner May Correct Defective Work

In the first sentence of Paragraph 14.07.A, delete the words "7 days" and replace with the words "21 days". **PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD**

15.01 PROGRESS PAYMENTS

SC-15.01 Add the following language at the end of Paragraph 15.01.B.4:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage or invest the retainage for the benefit of the Contractor.

SC-15.01 Add new paragraph immediately after Paragraph 15.01.B.4:

5. The Application for Payment form to be used on this Project is EJCDC C-620. The Agency must approve all Applications for Payment before Payment is made.

SC-15.01 Add new paragraph immediately after Paragraph 15.01.B.5:

6. By submitting an Application for Payment based in whole or in part on furnishing equipment or materials, Contractor certifies that such equipment and materials are compliant with American Iron and Steel requirements. Manufacturer's Certification letter for materials satisfy this requirement. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

SC-15.01 Add the following paragraph immediately after Paragraph 15.01.C.2.c:

- a. The materials presented for payment in an Application for Payment comply with American Iron and Steel requirements.

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

The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.01 Add the following new paragraph after Paragraph 15.01.B.2:

- a. For All Stored Materials:
 - i. The Contractor shall submit the Manufacturer's short-term and long-term storage and shall have established a written program to implement the Manufacturer's required storage procedures, including written schedule for all required maintenance activities.
 - ii. For each payment requisition that includes payment for stored materials, Contractor shall include the following documentation:
 - 1) Identification of the item(s), including model number, serial number and photographs.
 - 2) Copy of the updated maintenance schedule including certification that all required maintenance has been performed.
 - 3) Lien waivers for the preceding monthly payments.
 - iii. Contractor shall furnish evidence that payment for stored materials has in fact been paid to the respective supplier(s) within sixty days of payment by Owner. Failure to provide such evidence of payment may result in the withdrawal of previous approval(s) and removal of the cost of related materials and equipment from the next submitted Application for Payment.
- b. For Off-Site Stored Materials:
 - i. Payment for off-site stored materials will be determined on a case-by-case basis at the discretion of the Owner and, if considered acceptable by Owner, the off-site facility shall be no more than 2 hours from the job site by car.
 - ii. Contractor shall provide the Owner and/or Engineer guaranteed right-of-entry to the storage facility to inspect the stored materials. Contractor shall be responsible for paying travel costs and Engineer's time associated with inspections.
 - iii. Contractor's Builder's Risk certificate of insurance shall explicitly identify the off-site storage location as well as transportation of stored materials from the storage facility to the job site.

SC-15.01 Add new paragraphs immediately after paragraph 15.01.B.4 of the General Conditions which are to read as follows:5. The Engineer shall receive and review, in connection with its review of the Contractor's applications for payment, the weekly payroll records required to be submitted by the Contractor pursuant to MGL Chapter 149, Section 27B. Such review shall be for the purpose of

determining that the amount of wages paid to laborers employed on the project is no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Industries. The Engineer shall maintain, as part of the Project records, one complete copy of all such payroll records, and shall transmit to the OWNER, upon completion of the review provided for herein, the original weekly records as submitted by the Contractor. The Engineer shall promptly notify the Owner if (1) any payroll records submitted by the Contractor do not represent payment of at least the applicable prevailing wage rates established for the project or (2) the Engineer knows or has reason to believe that the weekly payroll records submitted by the Contractor do not accurately represent the wages actually paid to laborers employed on the project and that the Contractor is not paying said laborers at least the amount of said prevailing wage rates."

Delete paragraph 15.01.C.1 of the General Conditions in its entirety and insert the following in its place:

1. Progress Payments will be made in accordance with Massachusetts General Law Chapter 30, Section 39K.

Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place: 1. **Thirty** days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

After Subparagraph 15.01.E.1.l add new subparagraphs:m. Contractor has failed to make payment to Subcontractors or Suppliers or for labor.

- n. Contractor has not delivered, or Engineer has not been given sufficient time to review such submittals and other documentation as final shop drawings; warranties; installation, operation and maintenance manuals; test reports, certifications; start-up reports and other documentation required by the Contract Documents.
- o. Contractor has not complied with applicable prevailing wage rates established for the project as established by the Massachusetts Executive Office of Labor and Workforce Development, Department of Labor Standards (DLS), as determined by Engineer's review of the Application for Payment.

15.02 CONTRACTOR'S WARRANTY OF TITLE

SC-15.02 Amend Paragraph 15.02.A by striking out the following text: "7 days after".

15.03 *Substantial Completion*

SC-15.03 Add the following to the end of the Paragraph 15.03.C:

1. Substantial Completion shall only be granted for the Milestones identified in the Agreement.

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

2. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be

paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

SC-15.03 Add the following new subparagraph immediately after Paragraph 15.03.F:

- G. ENGINEER shall be entitled to withhold substantial completion if CONTRACTOR has not brought all systems and subsystems that are part of the Work substantially complete to functioning condition to the satisfaction of the OWNER; provided training to OWNER to the satisfaction of the OWNER on all operating systems that are part of the Work substantially complete; and provided all necessary documentation for operation and maintenance of all operating systems including, but not limited to, final manufacturer's operation and maintenance manuals.

15.08 *Correction Period*

SC-15.08 Add the following new Paragraph 15.08.G:

- G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC-6.01.B.1; or if no such revision has been made in SC-6.01.B, then the correction period is hereby specified to be **one** years after Substantial Completion.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

SC-16.02 Delete paragraph 16.01.A of the General Conditions in its entirety and insert the following in its place:

- A. OWNER may order, at any time and without cause, suspension of the Work in accordance with Massachusetts General Law Chapter 30, Section 39O..

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

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

- C. Any dispute or controversy between OWNER and CONTRACTOR arising out of, relating to, or concerning any interpretation, construction, performance or breach of this CONTRACT, shall be controlled by applicable Massachusetts law. Any lawsuit arising out of such dispute or controversy shall be filed in the County Superior Court in the Commonwealth of Massachusetts, unless otherwise agreed by CONTRACTOR and OWNER in writing.

ARTICLE 18—MISCELLANEOUS

SC-18.10 Add new paragraphs immediately after paragraph 18.10.A of the General Conditions which read as follows:

18.11. Addresses

- A. Both the address given in the Bid Form upon which this Agreement is founded, and CONTRACTOR's office at or near the site of the Work are hereby designated as

places to either of which notices, letters, and other communications to CONTRACTOR shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first named place, in any post office box regularly maintained by the post office department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon CONTRACTOR; and the date of said service shall be the date of such delivery or mailing. The first named address may be changed at any time by an instrument in writing, executed and acknowledged by CONTRACTOR, and delivered to OWNER and ENGINEER. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon CONTRACTOR personally.

18.12 Wage Rates:

- A. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be a part of these Contract Documents. Copies of the wage schedules are included in SC-32 of these Supplementary Conditions. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such person shall be paid at not less than such rates as shall be determined by the officials administering the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. CONTRACTOR shall notify OWNER of CONTRACTOR's intention to employ persons in trades or occupations not classified in sufficient time for OWNER to obtain approved rates for such trades or occupations.
- B. The schedules of wages referred to above are minimum rates only, and OWNER will not consider any claims for additional compensation made by CONTRACTOR because of payment by CONTRACTOR of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be resolved by CONTRACTOR.
- C. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the work.
- D. The State schedule of minimum wage rates are included in SC-32 of these Supplementary Conditions. Where rates differ, the higher rates shall apply as a minimum for that trade.

END OF SECTION

EXHIBIT A—SOFTWARE REQUIREMENTS FOR ELECTRONIC DOCUMENT EXCHANGE

Item	Electronic Documents	Transmittal Means	Data Format	Note (1)
a.1	General communications, transmittal covers, meeting notices and responses to general information requests for which there is no specific prescribed form.	Email	Email	
a.2	Meeting agendas, meeting minutes, RFI's and responses to RFI's, and Contract forms.	Email w/ Attachment	PDF	(2)
a.3	Contactors Submittals (Shop Drawings, "or equal" requests, substitution requests, documentation accompanying Sample submittals and other submittals) to Owner and Engineer, and Owner's and Engineer's responses to Contractor's Submittals, Shop Drawings, correspondence, and Applications for Payment.	LFE (FTP site)	PDF	
a.4	Correspondence; milestone and final version Submittals of reports, layouts, Drawings, maps, calculations and spreadsheets, Specifications, Drawings and other Submittals from Contractor to Owner or Engineer and for responses from Engineer and Owner to Contractor regarding Submittals.	LFE (FTP site)	PDF	
a.5	Layouts and drawings to be submitted to Owner for future use and modification.	Email w/ Attachment or LFE	DWG	
a.6	Correspondence, reports and Specifications to be submitted to Owner for future word processing use and modification.	Email w/ Attachment or LFE	DOC	
a.7	Spreadsheets and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	EXC	
a.8	Database files and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	DB	
Notes				
(1)	All exchanges and uses of transmitted data are subject to the appropriate provisions of Contract Documents.			
(2)	Transmittal of written notices is governed by Paragraph 18.01 of the General Conditions.			
Key				
Email	Standard Email formats (.htm, .rtf, or .txt). Do not use stationery formatting or other features that impair legibility of content on screen or in printed copies			
LFE	Agreed upon Large File Exchange method (FTP, CD, DVD, hard drive)			
PDF	Portable Document Format readable by Adobe® Acrobat Reader Version			
DWG	Autodesk® AutoCAD .dwg format Version			
DOC	Microsoft® Word .docx format Version			
EXC	Microsoft® Excel .xls or .xml format Version			
DB	Microsoft® Access .mdb format Version			

Exhibit C—Geotechnical Baseline Report Supplement to the Supplementary Conditions.

EJCDC® C-800, Supplementary Conditions of the Construction Contract.

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SC-20 COMMONWEALTH OF MASSACHUSETTS PROVISIONS

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

1.2. Applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply.

1.3. Massachusetts General Laws: The following are incorporated into the Contract by reference.

- 1.3.1. Chapter 30, Section 39I
- 1.3.2. Chapter 30, Section 39J
- 1.3.3. Chapter 30, Section 39L
- 1.3.4. Chapter 30, Section 39M
- 1.3.5. Chapter 30, Section 39P
- 1.3.6. Chapter 30, Section 39Q
- 1.3.7. Chapter 30, Section 39R
- 1.3.8. Chapter 82, Section 40
- 1.3.13. Chapter 149, Section 34
- 1.3.16. Chapter 149, Section 44J

1.4. Massachusetts General Laws: The following are incorporated into the Contract by insertion.

- 1.4.1. Chapter 30, Section 39F
- 1.4.2. Chapter 30, Section 39N
- 1.4.3. Chapter 30, Section 39O

2.0. TOWN OF WAREHAM

2.1. Order of Conditions from Wareham Conservation Commission (if issued).

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GENERAL LAWS OF MASSACHUSETTS

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE III. LAWS RELATING TO STATE OFFICERS

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES

Chapter 30: Section 39F. Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts

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

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

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

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

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

after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

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

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

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

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

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

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

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

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

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

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GENERAL LAWS OF MASSACHUSETTS

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE III. LAWS RELATING TO STATE OFFICERS

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES

Chapter 30: Section 39K. Public building construction contracts; payments

Section 39K. Every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, shall contain the following paragraph:— Within fifteen days (30 days in the case of the commonwealth, including local housing authorities) after receipt from the contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority will make a periodic payment to the contractor for the work performed during the preceding month 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, but less (1) a retention based on its estimate of the fair value of its claims against the contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and less (3) a retention not exceeding five per cent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one per cent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, or based on the record of payments by the contractor to the subcontractors under this contract if such record of payment indicates that the contractor has not paid subcontractors as provided in section thirty-nine F. If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen days (twenty-four days in the case of the commonwealth) after receipt of such a periodic estimate from the contractor, at the place designated by the awarding authority if such a place is so designated. The contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but

such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the contractor for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of section thirty-nine G shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall, subject to the provisions of section thirty-nine J, be conclusive for the purposes of this section.

Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of the awarding authority, less than 1 per cent of the adjusted contract price, or the awarding authority has determined that the contractor has substantially completed the work and the awarding authority has taken possession for occupancy, the awarding authority may send to the general contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The general contractor shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the general contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the awarding authority or before the contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the general contractor by certified mail, return receipt requested, the awarding authority may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the general contractor and such termination shall be without prejudice to any other rights or remedies the awarding authority may have under the contract. The awarding authority shall note any such termination in the evaluation form to be filed by the awarding authority pursuant to the provisions of section 44D of chapter 149.

GENERAL LAWS OF MASSACHUSETTS

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE III. LAWS RELATING TO STATE OFFICERS

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES

Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions

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

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

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GENERAL LAWS OF MASSACHUSETTS

PART I. ADMINISTRATION OF THE GOVERNMENT

TITLE III. LAWS RELATING TO STATE OFFICERS

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES

Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim

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

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

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

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SECTION SC-32WAGE RATES

Wage rates apply to this project. The Wage Rates are attached to these specifications or will be supplied as a separate document, issued as an Addendum. It is the responsibility of the Contractor, before bid opening, to request, if necessary, any additional information on Wage Rates for those trades people who are not covered by the applicable Wage Rates, but who may be employed for the proposed work under this contract.

Additional wage classifications and rates can only be added after bid opening. If required classifications are not listed in the wage determination, the Contractor must list the classifications and the rates that they propose to pay. This list will be forwarded to the **Massachusetts Department of Labor Standards 19 Staniford Street, 2nd Floor, Boston, MA 02108 (617) 626-6953** for approval. If DOL rejects any or all of the proposed rates as being too low, the Contractor will be required to pay the higher rate at no increase in the total contract cost. In any event, the rates the Contractor proposes to pay to those unlisted classifications should not be lower than the rate paid to a laborer.

Preferred Employees: In the employment of mechanics, laborers or workers to perform the work specified herein, preference shall be given to residents of the state who are, and continuously for at least six months prior to the date hereof have been, residents of this state, and if no such person is available then to residents of other states.

END OF SECTION

SECTION SC 36EQUAL OPPORTUNITY CLAUSE

During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or workers' representatives of the contractor's commitment under this section, and shall post copies of the notice in conspicuous places available employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Department and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's non compliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24,1965, so that such provisions

will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the Department may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Department, the contractor may request the United States to enter into such litigation to protect the interest of the United States.

END OF SECTION

SECTION SC-38EXECUTIVE ORDER 11246PART 1 - GENERAL1.1 DESCRIPTION

A. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this Contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941.
 - d. "Minority" includes:
 - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North American and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the CONTRACTOR, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.
3. If the CONTRACTOR is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and

to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The CONTRACTOR shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this Contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the CONTRACTOR should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The CONTRACTOR is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the CONTRACTOR has a collective bargaining agreement, to refer either minorities or women shall excuse the CONTRACTOR's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the CONTRACTOR during the training period, and the CONTRACTOR must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The CONTRACTOR shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the CONTRACTOR's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The CONTRACTOR shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the CONTRACTOR's employees are assigned to work. The CONTRACTOR, where possible, will assign two or more women to each construction project. The CONTRACTOR shall specifically ensure that all foremen, superintendents and other on-site supervisory personnel are aware of and carry out the CONTRACTOR's obligation to maintain

- such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the CONTRACTOR or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the CONTRACTOR by the union or, if referred, not employed by the CONTRACTOR, this shall be documented in the file with the reason therefore, along with whatever additional actions the CONTRACTOR may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the CONTRACTOR has a collective bargaining agreement has not referred to the CONTRACTOR a minority person or woman sent by the CONTRACTOR, or when the CONTRACTOR has other information that the union referral process has impeded the CONTRACTOR's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the CONTRACTOR's employment needs, especially those programs funded or approved by the Department of Labor. The CONTRACTOR shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the CONTRACTOR's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the CONTRACTOR in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year, and, by posting the company's EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of

- these meetings, persons attending, subject matter discussed and disposition of the subject matter.
- h. Disseminate the CONTRACTOR's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media and providing written notification to and discussing the CONTRACTOR's EEO policy with other Contractors and Subcontractors with whom the CONTRACTOR does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the CONTRACTOR's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source the CONTRACTOR shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a CONTRACTOR's workforce.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60.3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the CONTRACTOR's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the CONTRACTOR's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the CONTRACTOR is

a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these Specifications provided that the CONTRACTOR actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the CONTRACTOR's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the CONTRACTOR. The obligation to comply, however, is the CONTRACTOR's and failure of such a group to fulfill an obligation shall not be a defense for the CONTRACTOR's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The CONTRACTOR, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the CONTRACTOR may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the CONTRACTOR has achieved its goals for women generally, the CONTRACTOR may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The CONTRACTOR shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The CONTRACTOR shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The CONTRACTOR shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing Subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any CONTRACTOR who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The CONTRACTOR, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the CONTRACTOR fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 80-4.8.
14. The CONTRACTOR shall designate a responsible official to monitor all employment related activity to ensure that the company's EEO policy is being carried out, to submit reports relating to the provision hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction

trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

END OF SECTION

SECTION SC-40

CERTIFICATION OF NONSEGREGATED FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Certification of Nonsegregated Facilities - (Applicable to federally assisted construction Contracts and related Subcontracts exceeding \$10,000 which are not exempt from the Equal Opportunity Clause).

The federally assisted construction CONTRACTOR certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction CONTRACTOR certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction CONTRACTOR agrees that a breach of this certification is a violation of the Equal Opportunity clause in this Contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction CONTRACTOR agrees that (except where he has obtained identical certifications from proposed Subcontractors for specific time periods) he will obtain identical certifications from proposed Subcontractors prior to the award of Subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certifications in his files.

Signature	Date
-----------	------

Name and Title of Signer (Please Type)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

END OF SECTION

SECTION SC-41

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS
NONDISCRIMINATION IN EMPLOYMENT

To: _____
 (Name of union or organization of workers)

The undersigned currently holds Contract(s) with _____
 (Name of Applicant)

involving funds or credit of the U. S. Government of (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and in accordance with Executive Order 11246, dated September 24, 1965, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed, or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

- HIRING, PLACEMENT, UPGRADING, TRANSFER, OR DEMOTION;
- RECRUITMENT, ADVERTISING, OR SOLICITATION FOR EMPLOYMENT;
- TRAINING DURING EMPLOYMENT; RATES OF PAY OR OTHER FORMS
- OF COMPENSATION; SELECTION FOR TRAINING, INCLUDING
- APPRENTICESHIP; LAYOFF, OR TERMINATION.

This notice is furnished you pursuant to the provisions of the above contract (s) or subcontract(s) and Executive Order 11246.

COPIES OF THIS NOTICE WILL BE POSTED BY THE UNDERSIGNED IN CONSPICUOUS PLACES AVAILABLE TO EMPLOYEES OR APPLICANTS FOR EMPLOYMENT.

 /s/ _____
 (Contractor or Subcontractor)

 (Date)

END OF SECTION

SECTION 00920CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: _____ Owner's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Project: _____
 Contract Name: _____

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

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 Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. 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.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: None As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

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.

Engineer

By *(signature)*: _____
 Name *(printed)*: _____
 Title: _____

END OF SECTION

SECTION 00935NOTICE OF ACCEPTABILITY OF WORK

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Notice Date:	Effective Date of the Construction Contract:

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated **[date of professional services agreement]** ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By (signature): _____
 Name (printed): _____
 Title: _____

END OF SECTION

SECTION 00940

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Date Issued:	Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to: **[Check one or both of the following]**

Non-agreement on pricing of proposed change. Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ _____ **[increase] [decrease] [not yet estimated].**

Contract Time: _____ days **[increase] [decrease] [not yet estimated].**

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

Recommended by Engineer

Authorized by Owner

By: _____

Title: _____

Date: _____

SECTION 00941

CHANGE ORDER NO.: [Number of Change Order]

Owner: _____ Owner's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Project: _____
 Contract Name: _____
 Date Issued: _____ Effective Date of Change Order: _____

The Contract is modified as follows upon execution of this Change Order:

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	Change in Contract Times [as days or dates]
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous CO] : \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous CO] : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Accepted by Contractor

By: _____

Title: _____

Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____

Title: _____

Date: _____

Payment of change orders shall be made in accordance with one of the following three methods:

- A. Existing unit prices as set forth in the contract; or
- B. Agreed upon lump sum or unit prices; or
- C. Time and materials

A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the contractor may accept full and final payment at the contract unit price(s) for the acceptable quantities.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the contractor shall submit promptly in writing to the Engineer and offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

- (1) The estimated cost of labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 15% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 5%, for the general contractor of the sum of items (1) through (4) for overhead and profit,
- (7) Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained from above and is so stated in the change price, the contractor shall accept as full payment for which no other agreement is contained in contract, and amount equal to:

- (1) The estimated cost of Labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 15% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 5%, for the general contractor of the sum of items (1) through (4) for overhead and profit,
- (7) Credits for work deleted from the contract.

Explanation of items (1) through (7) as outlined in "B" and "C":

- (1) Labor – Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items (5) and/or (6). Hourly labor rates in excess of those as listed in the contract wage rates (Federal or State, whichever applies require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

- (2) Direct Labor Costs - These costs are limited to those which are required in the contract document. Coverage in excess of the contract provisions, secured by the contractor/subcontractor(s) at his/her option, are ineligible for financial assistance. The following list of typical direct labor charges is provided for your assistance and is in no way intended to be complete or all encompassing:
- Workman's Compensation
 - Federal/State: Social Security Tax and Unemployment Tax;
 - Health, Welfare and Pension Benefits; (this cost is included in the wage rates appearing in the Massachusetts Wage Rates of the contract specifications)
 - Liability Insurance: Bodily Injury;
Excess Umbrella;
Property damage;
Public Liability
 - Blasters Insurance)
 - Builders Risk Insurance) If applied to any required
 - Experience Modification Insurance) direct labor costs.
 - Surcharges)

Following award and prior to execution of a construction contract, the contractor and filed sub-bidders (where applicable) shall submit for review by the owner, documentation to establish the Direct Labor Cost percentage(s) (Direct Labor markup percentage(s)).

The documented direct labor markup for this contract may be adjusted on an annual basis as measured from the date the contract is executed. The contract agreement will provide for the establishment of the Direct Labor Cost percentage.

- (3) Material and Freight – Only those materials required as a result of the change order and reasonable freight charges for delivery of same are allowable.
- (4) Equipment – Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current Equipment Watch™ Rental Rate bluebook for Construction Equipment (the “Bluebook”). In determining the rental rate, the following shall apply:
- (a) For equipment already on the project – the monthly prorated rental rate by the hourly use shall be applicable;
 - (b) For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items (5) and/or (6)
(1 month (normal use) = 176 hours)
- (5) & (6) Overhead and Profit – All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).

- (7) Credits – Work deleted, material and equipment removed from the contractor, stored and/or returned shall be credited to the cost of the change order, less costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, Contractor shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer. Deviations from any of the above will be reviewed for financial assistance on a case-by-case basis.

CALCULATION SHEET - EXAMPLE

(1)	Labor				
	Foreman	10 hrs @ \$65.00/hr.	\$	650.00	
	Operator	10 hrs @ 55.00/hr		550.00	
	Laborers	20 hrs @ 40.00/hr		<u>800.00</u>	\$ 2,000.00
(2)	Direct Labor Cost (use the agreed upon Direct Labor Cost)				
	*	(50)% of \$2,000			
	*	(Used for example purposes only)			1,000.00
(3)	Materials & Freight				
	150 l.f. of 12" pipe @ \$100.00/l.f.		\$	1,500.00	
	15 v.f. precast SMH			3,000.00	
	Freight (slip # _____ Enclosed)			<u>500.00</u>	5,000.00
(4)	Equipment				
	1 Backhoe 10 hrs @ \$100.00/hr		\$	1,000.00	
	1 Truck-crane 10 hrs @ \$100.00/hr			<u>1,000.00</u>	<u>2,000.00</u>
		Total (Items 1 through 4)			10,000.00
(5)	15% markup for Overhead, Profit				
	15% of \$10,000				1,500.00
(6)	5% markup for general contractor (if subcontractor is involved)				
	5% of \$10,000				500.00
(7)	Credits (deductibles)				<u>-1,000.00</u>
		Total Cost	\$		11,000.00

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, Calculations, photographs, reports, etc.

END OF SECTION

SECTION 01010SUMMARY OF WORKPART 1 - GENERAL1.1 DESCRIPTION:

- A. Location: The Work locations include, but are not limited to, the Wareham Water Pollution Control Facility (WPCF) and locations within the rights-of-way on the following streets and easements in the Town of Wareham, Massachusetts.
 - 1. Main Street
 - 2. Sandwich Road
 - 3. Narrows Road
 - 4. Minot Avenue
- B. The Work includes, but is not limited to, the following:
 - 1. Construction of a new "gooseneck" high point in the force main at the WPCF.
 - 2. Existing flow management/bypass pumping for installation of new sanitary force main lining system, manholes and connections.
 - 3. Sewer System Rehabilitation:
 - a. Construction of Flexible Fabric Reinforced Pipe (FFRP) liner in existing 16-inch and 18-inch ductile iron force main.
 - b. Connections to existing force mains.
 - c. Connection to air release manholes, sewer gates, air vents and other structures.
 - 4. Testing of sanitary force main, valves and manholes for proper installation and performance.
 - 5. All related site work including access pits for lining, test pits, trench excavation, ledge excavation, groundwater dewatering, disposal of excess excavated materials, bedding, backfill, compaction, road/drive subbase, paving, loam/seed and landscaping.
 - 6. Other miscellaneous work shown in the Specifications for a complete and operational system.
- C. Related Work Specified Elsewhere
 - 1. Coordination: Section 01050
 - 2. Alternates: Section 01100
 - 3. Construction Schedules: Section 01310
 - 4. Temporary Bypass Pumping Systems: Section 01515
 - 5. Traffic Regulation: Section 01570
 - 6. Site work, piping, structures, testing requirements are specified in Division 2.
- D. Removals, Relocations and Rearrangements
 - 1. Examine the existing site for the work of all trades which will influence the cost of the work under the bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the

- finished project. The Contractor is responsible for all coordination in this regard.
2. Provide in the bid a sufficient amount to include all removals, relocations, rearrangements and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.
 3. Provide in the bid a sufficient amount to include all temporary facilities required to maintain flows during the construction period, including bypass pumping, temporary piping, temporary metering, etc. The cost shall include the cost for all labor, tools, equipment and materials necessary.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TEMPORARY BYPASS

- A. Base bid:
 1. Owner provides and maintains temporary bypass.
- B. Alternate No. 1:
 1. Contractor provides and maintains temporary bypass.

3.2 MAINTAIN EXISTING WORKS

- A. Continuous Operations Criteria:
 1. The Contractor shall conduct operations in such a manner and sequence which shall neither result in a disruption of, nor interfere with, the functional workings of any existing utilities.
 2. The Contractor shall furnish, install and operate any piping, equipment and appurtenances necessary to provide the temporary services/facilities required during construction including, but not limited to, bypass pumping, flow barriers and diversions. Temporary facilities, if required, shall have pumping capacity equal to or greater than the existing maximum capacity of the piping as determined by their size and slope.
 3. The Owner will operate and maintain all existing systems and equipment not modified or impacted by the project. The Contractor shall notify and coordinate with the Owner whenever Contractor's temporary facilities or construction will interface with existing utilities.
- B. Minimize Interference
 1. The Contractor shall at all times conduct operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted.

2. Work of connecting with, cutting into and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

3.3 CONSTRUCTION SEQUENCE

- A. Construction of the proposed liner will disrupt the existing structures and operations. To maintain continuous operations, the construction must be divided into phases or sequenced appropriately.
- B. The Contractor shall submit to the Engineer for review and acceptance a complete schedule of the proposed sequence of construction operations prior to commencing any work. This schedule shall include the Contractor's plans for doing the work.
- C. The Contractor shall submit to the Engineer a written request to deviate from the above sequence with adequate supporting information to demonstrate to the Engineer that the continuity and degree of treatment will not be adversely affected.
- D. The Contractor shall sequence construction such that the following criteria can be complied with:
 1. Service from the Narrows Pump Station must be maintained at all times by bypass pumping or trucking.
 2. Minimize traffic impact and maintain traffic flow on Sandwich Road, Narrows Road, and Minot Avenue.
 3. Work must be conducted in existing roadways and driveways if within 100 feet of a wetland area.
 4. Pits and trenches must be closed at the completion of each workday.
- E. Anticipated Construction Sequence:
 1. Establish bypass pumping.
 2. Drain force main pipe and inspect for defects that interfere with liner installation.
 3. Repair force main pipe defects based on results of inspection acceptable to Engineer and liner manufacturer.
 4. Clean force main pipe.
 5. Inspect force main pipe.
 6. Provide new "gooseneck" high point in force main at WPCF.
 7. Replace Air Release Manhole.
 8. Install liner and test.
 9. Inspect lined force main.

3.4 SITE ACCESS LIMITATIONS

- A. Contractor will not be allowed access into or across the railroad property of the Commonwealth of Massachusetts (Massachusetts Coastal Railroad).

3.5 SCHEDULE LIMITATIONS AND WORK RESTRICTIONS/ REQUIREMENTS

- A. Work Hours:
 - 1. Work hours are defined in the Section 00700 (General Conditions) and Section 00800 (Supplemental Conditions).
 - 2. All Work shall be performed between the hours of 7 AM and 9 PM, unless otherwise approved by the Owner.
 - 3. The Contractor shall request permission to work outside the work hours specified above at least 72-hours in advance of the proposed work. The Contractor shall not commence work outside of the work hours specified above unless or until granted such permission from the Owner and Engineer.
- B. Maintain Services:
 - 1. Maintain all existing force main connections.
- C. Traffic Control Plan:
 - 1. A project-specific Traffic Control Plan shall be submitted prior to the Pre-Construction Meeting (refer to Section 01570). The Traffic Control Plan shall identify traffic management requirements for each distinct component of the project.
 - 2. Contractor shall provide one lane for the passage of traffic within any work zone unless approved by the Owner.
 - 3. Contractor shall maintain access to all residences and businesses at all times.
 - 4. Contractor shall main access for garbage collection and mail services to all residences and businesses at all times. Contractor shall coordinate with these service providers.
 - 5. Contractor shall maintain access for bus routes, schools, day care facilities, etc. at all times. Contractor shall coordinate efforts with local school district to ensure access.
- D. Special Coordination Requirements:
 - 1. Portions of this work including lining pipe underneath tracks of the Massachusetts Coastal Railroad. No access is allowed on property of the Railroad. Contractor will coordinate with Railroad and comply with any requirements.
- E. Pavement Maintenance and Winter Shutdown Period:
 - 1. The Contractor shall maintain pipe trenches with compacted gravel until pavement operations can be completed.
 - 2. No excavation in paved roadways shall be allowed after November 15.

END OF SECTION

SECTION 01045CUTTING, CORING AND PATCHINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included - This section establishes general requirements pertaining to cutting, excavating, coring, fitting, and patching of the Work required to:
1. Make alterations to existing structures.
 2. Make the parts fit properly.
 3. Replace work not conforming to requirements of the Contract Documents.
 4. Contractor is responsible for all cutting, coring, and rough and finish patching. Contractor shall coordinate the work of any and all subcontracting trades performing the work.
 5. Contractor is responsible for reviewing with the Owner and Engineer and receiving permission to proceed prior to cutting and coring and patching.
- B. Quality Assurance:
1. Perform all cutting, coring and patching in strict accordance with pertinent requirements of these Specifications, and in the event no such requirements are determined, in conformance with the Engineer's written direction.
- C. Submittals:
1. Provide a shop drawing submittal to include the following information:
 - a. Identification of coring and cutting subcontractor including: Company name, business address contact information, or if by Contractor indicated as such.
 - b. List of type of coring and cutting equipment proposed to be used with equipment cuts of the equipment.
 - c. Schedule indicating the: location of the core or cut, size and any potential obstructions or embedded conduits and wiring.
 - d. Key plan indicating the location of anticipated cores and cuts.
 2. Request for the Engineer's consent:
 - a. Prior to cutting which affects structural safety, submit written request to the Engineer for permission to proceed with cutting.
 - b. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, Contractor shall notify the Engineer and secure written permission prior to proceeding.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials for replacement of work shall be equal to those of adjacent construction and shall comply with the pertinent sections of these Specifications.
- B. Grout for rough patching shall be as specified in Division 3.

PART 3 - EXECUTION

3.1 CONDITIONS

- A. Inspection:
 - 1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, coring, backfilling, and patching.
 - 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and secure needed directions.
 - 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION PRIOR TO CUTTING AND CORING

- A. Provide all required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the work.
- B. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

3.3 CORING

- A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.
- B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
- C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
- D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling. Slurry or tailings shall not be allowed to enter floor drains.
- E. Work area (e.g., adjacent walls, floors, ceilings, pipes, conduits, etc.) shall be cleaned to remove splash residues from coring operation.

3.4 CUTTING

- A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.
- B. Provide for control of slurry generated by sawing operation on both sides of wall.
- C. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.
- D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.
- E. Provide equipment of adequate size to remove cut panel.
- F. Slurry or tailings resulting from cutting operations shall be vacuumed or otherwise removed from the area following drilling. Slurry or tailings shall not be allowed to enter floor drains.

3.5 PERFORMANCE

- A. Perform all required excavating and backfilling as required under pertinent sections of these specifications. Perform cutting, coring and demolition by methods which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and/or new work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.
- B. Coring or cutting which exposes cut surfaces of reinforcing steel or structural steel shall be coated. Coating shall be 10 mil (dry film thickness) applied in two 5 mil (dry film thickness) coats of a single component moisture cured coal tar urethane or two part coal tar epoxy corrosion barrier. Alternately the exposed steel can be cut back two inches from the surface and a non-shrink grout applied over the steel flush to the concrete core or cut surface.
- C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown.
- D. Finish patching shall match existing surfaces as approved.

END OF SECTION

SECTION 01050COORDINATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.
- B. Other Construction Contractors may be interfacing with this Contract and working within the work area and in the vicinity of this Contract. The Contractor, under this contract, shall act as Construction Coordinator and shall coordinate construction activities with other Contractors working for Owner.
- C. Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or their subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

1.2 COORDINATION WITH OTHERS

- A. Town of Wareham
 - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the Wareham Police Department. The Contractor shall notify Wareham Police, Wareham and Onset Fire Departments and Wareham EMS/Ambulance Service at least 24 hours in advance of any street closings or detours.
 - 2. Contractor shall coordinate and get approval from the Town of Wareham prior to any excavation.
 - 3. Contractor shall coordinate all work on Town property with the treatment plant personnel.
 - 4. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
 - 5. The Contractor shall be responsible for coordinating work in the vicinity of drain lines with the Wareham Public Works Department.
- B. Wareham Water Department
 - 1. Contractor shall be responsible for coordinating all work in the vicinity of water lines with the Wareham Water Department. Contractor shall bear all costs for the Department's inspection requirements, temporary facilities, water main adjustments and other requirements.
- C. Eversource:
 - 1. The Contractor shall be responsible for coordinating all work around Eversource facilities with Eversource and shall bear all costs of inspection requirements, temporary facilities relocation and other requirements.

- D. Verizon:
 - 1. The Contractor shall be responsible for coordinating all work around Verizon facilities with Verizon and shall bear all costs of inspection requirements, temporary facilities relocation and all other requirements.
- E. Comcast:
 - 1. The Contractor shall be responsible for coordinating all work around Comcast facilities with Comcast and shall bear all costs of inspection requirements, temporary facilities relocation and all other requirements.
- F. Massachusetts Coastal Railroad:
 - 1. The Contractor shall be responsible for coordinating all work under Mass Coastal Railroad tracks with Mass Coastal Railroad and shall bear all costs of inspection requirements and other requirements.
- G. The Contractor shall provide the Resident Project Representative and Superintendent a construction schedule indicating the times to perform the work required. The Contractor shall update the schedule when required and give the facility one week notice before the start of any work. The Contractor shall provide the facility personnel enough time to obtain materials and perform the work required of them. The Contractor shall daily communicate with the Resident Project Representative and Superintendent concerning updating the schedule, job progress, delay or early starts that affect the force main flow, bypass time, etc.
- H. Weekly coordination meetings shall be held between the Contractor, Owner's Superintendent and the Resident Project Representative. This meeting shall cover the following:
 - 1. Work to be completed the following week
 - 2. Project Schedule
 - 3. Shop Drawing and O&M issues
 - 4. Outstanding RFIs and Clarifications
 - 5. Change Orders and Field Orders
 - 6. Review of Record Drawing Information
 - 7. Discussion/Resolution of any old issues
 - 8. New issues discussion
 - 9. Contractor's Safety and Health Plan Updates
- I. Snow Removal Coordination: The Contractor shall be responsible for all snow removal activities in construction and laydown areas. WPCF staff will be responsible for snow removal on the main access road around the facility. Contractor is to coordinate closely with WPCF staff to maintain access to all areas of the facility to facilitate normal operations.

1.3 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall have use of the premises as defined in the General Conditions for the performance of the Work.
 - 1. Wastewater Treatment Facility
 - a. Contractor laydown area as coordinated with Owner.
 - b. Contractor's parking area as coordinated with the Owner.
 - 2. Narrows Pump Station
 - a. Contractor laydown area as coordinated with Owner.

- b. Contractor's parking area as coordinated with the Owner.
Contractor work hours will be limited to 7:00AM to 9:00PM, Monday through Friday. Any work outside these hours will require permission of the Owner and adequate notice.
- B. Contractor shall maintain access and utilities to the Wastewater Treatment Facility and all other adjacent facilities at all times. Whenever access is cut off in one direction, an alternative route for accessing all equipment and tankage must be maintained.
- C. Contractor shall coordinate delivery schedules, site access, and other construction-related activities with any other contractors that may be hired by the Owner during the course of construction.
- D. Contractor shall assume full responsibility for security of all of their, and their subcontractors, materials and equipment stored on the site.
- E. If directed by the Owner, Contractor shall move any stored items which interfere with operations of Owner.
- F. Obtain and pay for use of additional storage or work areas if needed to perform the Work.
- G. Contractor shall not have access to Owner's lunch room, toilet or locker room facilities at any time and shall provide all necessary facilities in accordance with Specification Section 01500.

END OF SECTION

SECTION 01070ABBREVIATIONS & SYMBOLSPART 1 - GENERAL1.1 DESCRIPTION

A. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway & Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AIEE(IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
AMP	Ampere 125-16
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16 11960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
CCTV	Closed Circuit Television
CF	Cubic Foot
CFM	Cubic Foot Per Minute
CFS	Cubic Foot Per Second
CI	Cast Iron
CIPP	Cured-in-Place Pipe
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
CY	Cubic Yard
DC	Direct Current
DEP	Department of Environmental Protection
DI (DIP)	Ductile Iron (Pipe)
DOT	Department of Transportation
EDR	Equivalent Directional Radiation
EPA	U.S. Environmental Protection Agency

FFRP	Flexible Fabric Reinforced Pipe
FPS	Feet Per Second
FT	Feet
GAL	Gallons
GPD	Gallons Per Day
GPM	Gallons Per Minute
HP	Horsepower
IN	Inches
ISA	Instrument Society of America
KVA	Kilovolt-ampere
KW	Kilowatt
LB	Pound
MACP	Manhole Assessment and Certification Program
MAX	Maximum
MGD	Million Gallons Per Day
MIN	Minimum
NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
PPM	Parts Per Million
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
RPM	Revolutions Per Minute
RUS	Rural Utility Service
SF	Square Foot
STL. W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
SY	Square yard
TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01100ALTERNATESPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Each Bidder shall be held fully responsible for examining the scope of the Alternates generally defined herein and for recognizing any modifications to the Work caused by any Alternate.

B. Alternate:

1. To enable the Owner to compare total costs where alternate materials and methods might be used, an Alternate has been established as described in this Section of these Specifications.

C. Related Work Specified Elsewhere:

1. Materials and methods to be used in the Base Bid and in the Alternate have been described in pertinent Sections of these Specifications.
2. Method for stating the proposed Contract Sum is described in the Bid Form.

D. Submittals:

1. All Alternates described in this Section are required to be reflected on the Bid Form as submitted by bidders. However, do not submit alternates other than as described in this Section, except as provided for "substitutions" under the General Conditions.

PART 2 - PRODUCTS2.1 PRODUCT HANDLING

- A. If the Owner elects to proceed on the basis of one or more of the described Alternatives, make all modifications to the Work required in furnishing and installing the selected Alternative or Alternatives to the approval of the Engineer and at no additional cost to the Owner other than as proposed on the Bid Form.

2.2 ALTERNATE NO. 1 – ADD TEMPORARY BYPASS PUMPING

- A. The work of this ALTERNATE shall consist of constructing, operating, and maintaining a bypass pumping system during the period that the force main is not operational in order to complete the project.

PART 3 - EXECUTION3.1 ADVANCE COORDINATION

- A. Immediately after award of the Contract, or as soon thereafter as the Owner has made a decision on whether the Alternate will be selected, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of Alternates selected by the Owner. Use all means necessary to alert those personnel and suppliers

involved as to all changes in the work caused by the Owner's selection or rejection of the Alternate.

END OF SECTION

SECTION 01150MEASUREMENT AND PAYMENTPART 1 - GENERAL1.1 DESCRIPTION

- A. For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.
- B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.
 - 1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
 - 2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the workday.
 - 3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
 - 4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
 - 5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
 - 6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.
- B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work and until its final acceptance by the Engineer, and

for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the Work as herein authorized.

- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

- A. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

- A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

- A. Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

1.6 PAYMENT FOR MATERIAL DELIVERED

- A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.
- B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

- A. After final measurements are made by the Engineer, the Contractor will prepare a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

- A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:
 1. Pre-Construction photographs or videos.
 2. Project Record Documents

3. Signs
4. Clean-up and restoration of property.
5. Replacement of fences, curbs, structures, sign posts, guard rails, rock wall, mail boxes, traffic loop detectors, and other minor items disturbed by construction activities.
6. Restoration of fences and other structures.
7. Cooperation and coordination with other Contractors and utility companies including related inspection costs and other costs (Refer to Section 01050).
8. Utility crossings and relocations, unless otherwise paid for.
9. Temporary utility services to buildings, as required to maintain service during construction.
10. Minor Items, such as relocation of sign posts, guard rails, rock wall, mail boxes, curbs, traffic loop detectors, pavement markings, etc., damaged as a result of construction activities.
11. Trench boxes, steel and/or wood sheeting as required, including that left in place.
12. Maintenance of all existing sewer flows and repair of existing sewer pipes.
13. Dust control.
14. Quality assurance testing.
15. Clearing, grubbing and stripping.
16. Liming, fertilization, mulching, and watering. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications and other submittals required by the Contract Documents.
17. Repair and replacement of water lines under 2-inches in size, culverts, underdrains, rock lined drainage trenches in streets and other utilities damaged by construction activities and corresponding proper disposal of removed materials unless otherwise paid for.
18. Temporary construction necessary for construction sequencing and other facilities not permanently incorporated into the work.
19. Weather protection.
20. Permits not otherwise paid for or provided by the Owner.
21. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
22. Contract administration and insurance.
23. Test pits to establish in place field soils density, groundwater conditions, or requirements for dewatering.
24. Pipe markings.
25. Replacement of unsuitable material above pipe bedding and backfill.
26. Earthwork
27. Test Pits for the Contractor's Benefit
28. Temporary resetting or replacement of existing street and traffic signs and temporary traffic signals where necessary.
29. Raising and lowering of existing frames and covers of buried utilities to grade unless payment is otherwise provided for.
30. Horizontal adjustment of existing frames, covers, and grates to match final grades and curb faces.

31. Removing and replacing existing SMH inverts to accommodate new and replacement pipes.
32. Removing and resetting of existing steps, guard rails, fences, walls and non-paved brick or paver walkways disturbed during construction, other than those identified on the Drawings to be replaced.
33. Protection of existing block and stone retaining walls unless otherwise identified to be removed, relocated or modified in the Drawings.
34. Cross-over channels and underdrains for sewer, storm drain and water excavation pits, and check dams for all excavated channels.
35. Installing temporary pavement markings on binder course that will not be surfaced within 14 days of installation.
36. Installing raised pavement markers and temporary symbols on the binder course within 48 hours of installing any section of the binder course and maintaining these throughout the project duration.
37. Locating and verifying the locations of sewer services within the limits of work. Capping or plugging existing underground utilities as shown on the plans and dye testing as required to determine reconnection requirements.
38. Removal and subsequent delivery of replaced or obsolete frames, covers, grates, hydrants curbstones and signs to a location within the City limits designated by the Owner.
39. Leak testing of all existing sewer manholes whose frames and covers have been replaced.
40. Removal of temporary or permanent pavement markings, prior to paving. This includes removing markings that are applied on the winter binder layer, prior to installation of the wearing course.
41. Flushing and final cleaning of storm drain system.
42. Completion of the Storm Water Pollution Prevention Plan as well as required inspections, monitoring and reporting.
43. Restoration of property markers and monuments by a Massachusetts licensed PLS.
44. Clearing, grubbing and stripping and stockpiling of topsoil.

1.9 DESCRIPTION OF PAY ITEMS

- A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.
- B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

(1) – Mobilization/Demobilization

- A. Method of Measurement: Lump sum. Total of bid item shall not exceed 5% of Total Amount of the Base Bid.
- B. Basis of Payment: Mobilization/demobilization costs are those costs of initiating and ending the contract. Payment for mobilization/demobilization shall be a lump sum at the price as stated in the Bid Form. Seventy-Five percent (75%) of the lump sum will be payable when the Contractor is operational on the site and the remaining 25% of the lump sum will be payable when the Contractor leaves the site following the completion of all contract work. For purposes of payment on this item, “Operational”

shall mean the Contractor has provided all required and properly executed bonds and insurance certificates and the Owner has approved the following: Construction Schedule, Erosion Control Plan, Traffic Control Plan, Project Sign (and installed), Temporary Facilities, and Pre-Construction photographs/videos. "Operational" shall also mean Contractor has performed the pre-construction television sewer inspection, delivered the records of it to the Engineer and the Engineer has acknowledged the records are accurate and of use. Only one lump sum payment divided into the two partial payments described herein shall be made to cover all mobilization and demobilization costs throughout the entire contract.

(2) – Erosion and Sedimentation Control

- A. Method of Measurement: Erosion and sedimentation control shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The lump sum contract price shall be full compensation for all labor, materials, equipment, and tools necessary to complete this work including but not limited to installation, maintenance, and removal of erosion and sedimentation control measures as required by the plans and specifications (including all stockpile and staging areas), the Town of Wareham, and the Commonwealth of Massachusetts; and all else incidental thereto for which payment is not provided under other items. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(3) - Traffic Management

- A. Method of Measurement: Traffic regulation and control will be paid for at the Lump Sum unit price as stated in the Bid Schedule.
- B. Basis of Payment: Payment for traffic regulation and control shall constitute full compensation for all traffic regulation and control efforts and including all labor, materials, equipment, signage and supervision required to provide comprehensive and professional traffic regulation and control at all project locations, excluding police details. The traffic control plan, temporary pavement markings for traffic re-routing and pedestrian safety are included in this item. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(4) – Test Pits

- A. Method of Measurement: Test pit excavations shall be paid for at the unit price per each test pit as stated in the Bid Form. The quantity to be paid for under this item shall be the actual number of test pits performed as shown on Contract Drawings or as authorized by the Engineer.
- B. Basis of Payment: The unit price shall be full compensation for furnishing all labor, materials, equipment, and tools necessary for sawcut, management, removal, and disposal of pavement; excavation (except ledge excavation), dewatering, backfill including aggregate base and subbase, compaction, temporary pavement; providing the test pit result information to the Engineer and for all other work and expenses incidental thereto for which payment is not provided under other items.

(5) - Excavation Dewatering

- A. Method of Measurement: Lump Sum.
- B. Basis of Payment: Payment for dewatering shall be a lump sum at the bid price as stated in the Bid Schedule. Said lump sum price shall constitute full compensation for all dewatering efforts including well point systems, pumping with sumps, and any other method of dewatering or pre-draining of soils necessary to complete the work. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(6) – Dewatering, Cleaning, and Inspection of Existing Force Main

- A. Method of Measurement: Dewatering, Cleaning, and Inspection of Existing Force Main shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The lump sum contract price shall be full compensation for all labor, materials, equipment, and tools necessary to complete dewatering, cleaning, and inspections of the force main. Work under this item shall include force main line cleaning, flushing, flushing water, and disposal of material removed from the force main pipe; CCTV inspections of the force main prior to relining video and prior to the lining installation, and all appurtenant work as needed to complete the work; and all else incidental thereto for which payment is not provided under other items. This bid item does not include traffic management

(7) - Force Main Lining

- A. Method of Measurement: Lump Sum.
- B. Basis of Payment: Payment for Force Main Lining shall be the lump sum at the bid price stated in the Bid Schedule. Said lump sum price shall include compensation for furnishing all labor, on-site manufacturer representative, materials, tools, and equipment; and management, transportation, and disposal of excess soils necessary for pipe lining, complete, satisfactorily tested, and operational. Work under this item shall also include repairs to or rehabilitation of the force main and connections required by the lining manufacturer prior to lining; construction of a gooseneck at the WPCF; lining the force main; sealing around liner in manholes and at lateral connections; lateral connection; testing; and all appurtenant work as needed to complete the work; and all else incidental thereto for which payment is not provided under other items. Payment for this work will be according to the following percentages:
 - 1. Lining completed - 90%
 - 2. Testing - 10%

(8) – Post Liner Installation CCTV Inspection

- A. Method of Measurement: Post Liner Installation CCTV Inspection shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The lump sum price shall include compensation for furnishing all labor, materials, equipment, and tools necessary for CCTV inspection of the sewer after relining, and all appurtenant work as needed to complete the work.

(9) – Post Installation Liner Hydrotest

- A. Method of Measurement: Post Installation Liner Hydrotest shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The lump sum contract price shall be full compensation for all labor, materials, equipment, and tools necessary to complete the post installation liner hydrotest including flushing water, testing, inspection, and all appurtenant work as needed to complete the work.

(10) – Excavation Pits for Lining

- A. Method of Measurement: Pit excavations shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The lump sum price shall be full compensation for Work necessary to install liner including furnishing all labor, materials, equipment, and tools necessary for sawcut, management, removal, and disposal of pavement; excavation, backfill including aggregate base and subbase, compaction, and for all other work and expenses incidental thereto for which payment is not provided under other items.

(11) – Air/Vacuum Release Manhole

- A. Method of Measurement: Air/Vacuum Release Manhole shall be paid for at the Lump Sum price stated in the Bid Form .
- B. Basis of Payment:
 - 1. Air/vacuum release manhole shall be paid for at the bid price as stated in the Bid Form. The lump sum price shall constitute full compensation for all labor, materials, equipment, and tools necessary to complete this work including sawcut, management, removal and disposal of pavement; removal and disposal of existing manhole; excavation and bedding; furnishing and installing precast concrete sections, frames, covers, masonry materials, and waterproofing; backfilling including aggregate base and subbase material, compaction; cleaning, and testing; ductile iron pipe, fittings, valves, pipe sleeves and connectors; pipe supports; air release valve; and all else incidental thereto for which payment is not provided under other items. For payment limits and detail on this pay item refer to the air/vacuum release manhole detail in the Drawings.
 - 2. Payment for this item shall be as follows:
 - a. Manhole acceptable set-in place and backfilled – 90 percent.
 - b. Force main successfully connected and tested through manhole; air/vacuum release valve installed and tested; manhole successfully cleaned and tested – 10 percent.

(12) (13) – 16-inch Connectors and 18-inch Connectors, Additional

- A. Method of Measurement: Connectors shall be paid for at the unit price per set of connectors.
- B. Basis of Payment: Payment for connectors shall be the unit price stated in the Bid Schedule. Said unit price shall include compensation for furnishing connectors from the manufacturer including transportation to the WPCF for future use by the Owner.

(14) – Ledge Excavation

- A. Method of Measurement: The quantity of ledge excavation to be paid for under this item shall be the number of cubic yards of ledge removed during construction.

1. Exposing the ledge profile for measurement. Excavation and backfill of the earth overburden shall be considered incidental, and no separate payment shall be made, therefore.
 2. Should the Contractor elect to pre-drill and blast ledge without exposing the ledge surface for measurement, ledge depths shall be determined by the Resident Project Representative at the time of drilling or, when direct drilling observation is not conducted, the ledge profile shall be measured after excavation, and 20% of the ledge volume thus measured shall be deducted due to ledge expansion caused by the blasting operation.
 3. The payment limit for trench width shall be between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal outside diameter of pipe which is to be installed in the trench (min. of 3 feet) and extending from the top of the ledge surface to a depth of 6 inches below the invert grade of the pipe. Where two pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 3 feet plus the sum of the pipes nominal outside diameter. Where three pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 4.5 feet plus the sum of the pipes nominal outside diameter.
 4. Ledge excavation for structures (including manholes) shall be measured as 18 inches outside the structure and extending to a depth of 6 inches below the base of the structure indicated on the Drawings.
 5. Rocks or boulders greater than two cubic yards volume shall be considered as ledge excavation. Volume of rocks shall be determined from their average length, width, and depth as measured by the Engineer.
- B. Basis of Payment: The contract unit price per cubic yard for ledge excavation shall be full compensation for all labor, materials, equipment, and tools necessary to complete the excavation including conducting the pre-blast survey, drilling, blasting, excavating, loading and disposing the excess or unusable material outside the work limits, suitable replacement backfill, and all else incidental thereto for which payment is not provided under other items.
1. Not all the potential ledge locations are identified on the Drawings and ledge could be encountered anywhere within the limits of work. Such ledge, if encountered, is not considered a Differing Subsurface or Physical Condition. The unit price in the bid form shall apply to all ledge encountered and removed.

(15) – Flowable (Controlled Density) Fill

- A. Method of Measurement: The quantity of flowable fill to be paid for under this item shall be the number of cubic yards of flowable fill used as backfill as authorized by the Engineer. The payment limit for this item shall be between vertical planes that are a distance apart equal to the maximum pay limits of the excavation and extending to a depth as directed by the Engineer.
- B. Basis of Payment: Backfill with flowable fill shall be paid for at the unit price per cubic yard stated in the Bid Form. The unit price shall be full compensation for

furnishing all labor, equipment, and tools necessary for excavation; furnishing installing and compacting flowable fill, coordination with utility companies, and for all other work and expenses incidental thereto for which payment is not provided under other items.

(16) (17) (18) (19) - Initial Pavement, Final Pavement, Driveway Bituminous Pavement, and Bituminous Sidewalk

A. Method of Measurement:

1. The quantity of bituminous pavement to be paid for under this item includes the number of tons placed at the direction of the Engineer, calculated as described below.
2. Actual widths will be used in computing areas.
3. The conversion factor to change volume of bituminous pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.

B. Basis of Payment:

1. Pavement shall be paid for at the Contract unit price per ton stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary to complete this work including sawcut, management, removal, and disposal of pavement; preparation of base material; application of tack coat; placement of pavement; compaction; grading of gravel shoulder material to back up overlay pavement; and installation of temporary and permanent pavement markings. Not additional payment will be made to the Contractor for repair work done to maintain bituminous pavement.

(20) - Granite Curb, Remove and Reset

A. Method of Measurement: The quantity of granite curb to be paid for under this item shall be the linear feet of curb removed, stored, and reset as defined in the Documents and directed by the Engineer. Curb removed for the convenience of or damaged by the Contractor is not covered by this bid item.

B. Basis of Payment: The Contract unit price per linear foot for removal and resetting of existing curbs shall constitute full compensation for all labor, equipment and materials necessary to complete this work including excavation, backfill including aggregate base and subbase material, compaction, removing and storing existing curb, resetting of existing curb, concrete setting, replacement of damaged curb, repair of loam and seed behind curb as necessary, and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work in maintaining granite curb.

(21) - Concrete Sidewalk

A. Method of Measurement: Concrete sidewalks measured for payment shall be the number of square yards of concrete installed and accepted in place.

B. Basis of Payment: The contract unit price per square yard for concrete sidewalks shall be full compensation for all labor, materials, equipment, and tools necessary to complete this work including forms, concrete, expansion joint material, reinforcement, screened gravel and all other work and all else incidental thereto for which payment is not provided under other items.

(22) - Loam and Seed

- A. Method of Measurement: The quantity of loaming and seeding shall consist of the number of square yards of loaming and seeding installed at the direction of the Engineer within the limits of work shown on the drawings.
- B. Basis of Payment:
 - 1. The square yard unit price shall be full compensation for furnishing all labor, materials, and equipment required to place and grade loam, furnish and place seed, mulch, lime, fertilize and water, assure and maintain grass growth until final acceptance by the Engineer; and for all other work including grading of paved and unpaved areas disturbed during construction and expenses indicated thereto for which payment is not provided under other items. Areas disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.
 - 2. 80% at the completion of the installation of the loaming and seeding, upon acceptance by the Engineer. 20% upon final contract completion and consistent coverage and growth of the new turf.

(23) – Utility Relocation (Allowance)

- A. Method of Payment: Costs for the relocation of existing utilities shall be paid from an allowance bid item. Work not approved in writing by the Engineer shall not be measured for payment.
- B. Basis of Payment: Payment from the allowance item for the relocation of existing utilities will be adjusted for the final cost for this item as follows: Prior to final payment, Contractor shall present all receipts for this work, and an appropriate Change Order will be issued as recommended by the Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted. This bid item is for the actual cost of removing and relocating existing electric, natural gas, communication, and telephone utilities in direct conflict with the excavation required for installation of the force main lining as shown on the Contract Drawings. This bid item shall also cover the cost of excavation work completed by the Contractor directly associated with the utility relocation. Utilities damaged by the Contractor or relocated for the Contractor's convenience are not eligible for payment under this item.

(24) – Disposal of Contaminated Materials (Allowance)

- A. Method of Measurement: Contaminated materials excavation with offsite disposal shall be paid from an allowance bid item. Removal of existing curbing, catch basins, manholes, culverts, and sewers are to be considered incidental to this item if they are located within a recognized contaminated soil zone.
- B. Basis of Payment: Payment from the allowance item for disposal of contaminated material will be adjusted for the final cost for this item as follows: Prior to final payment, Contractor shall present all receipts for this work, and an appropriate Change Order will be issued as recommended by the Engineer to reflect actual amounts due Contractor on account of work covered by allowances, and the Contract Price shall be correspondingly adjusted. This bid item includes excavation to clean

materials, compaction of the resulting excavation sub grade, replacement of the removed contaminated soil with properly compacted sub-base, transport to a Massachusetts State approved disposal location, cost of the disposal, and providing to the Owner manifests from the receiving facility for all contaminated material. The manifests shall provide the quantity of material that was legally disposed of and location(s) of where the soil was disposed.

(25) – Uniformed Police Detail (Allowance)

- A. Method of Payment: Costs for uniformed police officers for traffic control shall be paid from an allowance bid item.
- B. Basis of Payment: Payment from the allowance item for Uniformed Police Officers will be adjusted for the final cost for this item as follows: Prior to final payment, Contractor shall present all receipts for this work, and an appropriate Change Order will be issued as recommended by the Engineer to reflect actual amounts due to the Contractor. This bid item is for the actual cost of uniformed police officers.

(26) – Price Adjustments (Allowance)

- A. Method of Payment: Costs for Price Adjustments for fuel, liquid asphalt, and Portland cement shall be paid from an allowance bid item.
- B. Basis of Payment: Payment from the allowance item for Price Adjustments will be adjusted for the final cost for this item as follows: Price Adjustments for fuel, liquid asphalt, and Portland cement will be tracked and calculated monthly based on the agreed upon pay quantities in the monthly pay requisition. Price adjustments will be calculated based on the procedure in Section 01151. Upon substantial completion of the work, a Change Order for the sum of monthly price adjustments will be issued to reflect the actual amount due to the Contractor or the actual amount credited to the Owner.

(27) – Temporary Force Main Bypass System

- A. Method of Measurement: Temporary Force Main Bypass System shall be paid for at the Lump Sum price stated in the Bid Form.
- B. Basis of Payment: The temporary bypass pumping system Lump Sum price shall include compensation for furnishing all labor, materials, equipment, and tools necessary to complete the installation, operation and breakdown of temporary bypass system, including pipe and fittings; valves, air valves, line stops, trench excavation and backfill at drives and roads, bituminous concrete pavement and berms, maintaining sewer force main service at all times, and all else incidental thereto for which payment is not provided under other items.

END OF SECTION

SECTION 01151SPECIAL PROVISIONS – PRICE ADJUSTMENTSPART 1 - GENERAL1.1 DESCRIPTION

- A. In accordance with Massachusetts General Law (MGL) Chapter 30, Section 38A, contracts for water and sewer projects awarded under MGL Chapter 30 Section 39M shall include price adjustment clauses for fuel (both diesel and gasoline), liquid asphalt and Portland cement contained in cast-in-place concrete.
- B. The work under this Contract includes price adjustments for hot mix asphalt, Portland cement, diesel fuel, and gasoline. Base Prices for hot mix asphalt, Portland cement, diesel fuel, and gasoline under this Project are defined as the Price presented on the Massachusetts Department of Transportation (MassDOT) website. MassDOT posts Price Adjustments on their Highway Division’s website at <https://www.mass.gov/massdot-contract-price-adjustments> under the following link sequences:

Website: Mass.gov
 Link 1: Living
 Select Transportation
 Scroll down toward the bottom and under Related Information
 Link 2: Department of Transportation
 Scroll down and under Our Organizations
 Link 3: Highway Division
 Scroll down to Featured Topics and under Highway Construction Resources
 Link4: MassDOT Contract Price Adjustment
 Link5: (Year) Price Adjustments

Prices may not be available for the month in which the project is Bid at the time the project is advertised for Bid. The Base Price will be confirmed after Contract Award and before the first monthly payment requisition. For this project, the recent Base Price History for the specified items is presented within Table 1.

Table 1 –Base Price History				
Description	Unit	March 2022	April 2022	May 2022
Diesel Fuel	per gallon	\$4.264	\$4.513	\$5.279
Gasoline	per gallon	\$3.404	\$3.441	\$4.071
Hot Mix Asphalt	per ton	\$665.00	\$682.50	\$717.50
Portland Cement	per ton	\$165.52	\$165.22	\$165.52

1.2 MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE

- A. Method of Measurement: The Bid Form does not include a specific Work Item for

fuel consumption; fuel consumption is considered incidental to the work. However, in order to comply with the MGL, compensation for fluctuations in fuel prices will be made based on monthly quantities of the designated work items completed during the payment period and the Fuel Use Factors presented in Table 5.

- B. Basis of Payment: The Contract includes an allowance to be used for all price adjustments including price adjustments for diesel fuel and gasoline. The Price Adjustment will be based on the variance in price for diesel fuel and gasoline from the Base Price to the Period Price only. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.
1. Base Price: The Base Price of diesel fuel and gasoline will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid , which includes State Tax.
 2. Period Price: The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month as posted on the MassDOT website.
 3. The adjustment will be based on fuel usage factors for various items of work developed in the National Cooperative Highway Research Program Report 744 (Transportation Research Board, 2013) and modified to correspond to Federal Highway Administration Technical Advisory T5080.3 (1980) and Highway Research Board Circular 158 (1974). These factors will be multiplied by the quantities of work completed under the designated Work Item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.
 4. The fuel Price Adjustment will apply only to the items of work listed in Table 5 at the fuel factors shown and for the quantities of those work items during that month.
 5. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
 6. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

1.3 MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT MIXTURES

- A. Method of Measurement: The quantity of the hot mix asphalt (HMA) mixtures will be measured under the respective Bid Item(s) in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.
- B. Basis of Payment: The Contract Price of the hot mix asphalt (HMA) mixtures will be paid under the respective Bid Item(s) in the Contract. The Contract includes an allowance to be used for all price adjustments including price adjustments for Hot Mix Asphalt Mixtures. The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price only. The adjustment shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following

month's Payment Application once pricing information for the period is available.

1. Base Price: The Base Price of Hot Mix Asphalt Mixtures will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid , which includes State Tax.
2. Period Price: The MassDOT website lists two sets of period prices. The "New Asphalt Period Price Method" applies to this Contract.
3. The "New Asphalt Period Price Method" presents the Period Price of liquid asphalt for each monthly period as determined by MassHighway using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. MassHighway will post this Period Price on their website within two business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassHighway the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.
4. The Contract Price of the hot mix asphalt mixture will be paid under the respective item in the Contract. The Price Adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the Price Adjustment Allowance in the Payment Application.
5. The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Contract Documents and as measured for the Hot Mix Asphalt Work Item.
6. The Price Adjustment will be determined using the following formula; the quantity of tons of hot mix asphalt mixture placed during each monthly period multiplied by the liquid asphalt content percentage multiplied by the variance in price between Base Price and Period Price of liquid asphalt. The liquid asphalt content, for the purpose of this adjustment, will be 5.5% (0.055) for each ton of bituminous concrete mixture regardless of percentages established in the Massachusetts Job Mix Formula (M3.11.03) of the Standards.
7. The Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
8. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

1.4 MONTHLY PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

- A. Method of Measurement: The quantity of the Portland Cement Concrete Mixes will be measured under the respective items in the Contract. The Price Adjustment will be made based on the quantity installed during the monthly payment period.
- B. Basis of Payment: The Contract Price of the Portland Cement Concrete Mixes will be paid under the respective item(s) in the Contract. The Contract includes an allowance to be used for all price adjustments including price adjustments for Portland Cement Concrete Mixes. The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price only. It shall not include transportation or other charges. Since the posted Prices may not be available before the end of the active work month for inclusion in the Payment Application, the Price Adjustment will be assessed in the following month's Payment Application once pricing information for the period is available.
1. Base Price: The Base Price of Portland cement will be the price as indicated on the MassDOT website (www.massdot.state.ma.us) for the month in which the contract was bid, which includes State Tax.
 2. The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the Construction Economics section of ENR Engineering News-Record magazine or at the ENR website <http://www.enr.com> under Construction Economics. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.
 3. The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been completed and accepted, using the monthly period price for the month during which the work was performed and will be paid under the Price Adjustment Allowance in the Payment Application.
 4. The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.
 5. The Price Adjustment will be determined using the following formula; the quantity of cubic yards of Portland cement concrete placed during each monthly period multiplied by the Portland cement content percentage multiplied by the variance in price between the Base Price and Period Price of Portland cement.
 6. This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases for either a 5% upward or 5% downward adjustments.
 7. No Price Adjustment will be allowed beyond the Substantial Completion Date of this Contract, unless an extension of time beyond the contractual Substantial Completion Date has been issued and approved by the Owner.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PREPARATION OF MONTHLY PAYMENT APPLICATION

- A. Payment Applications shall be submitted monthly. Table 2 presents an example calculation for determining Price Adjustments for the specified items.

Note: In this example, the Payment Application for June will be submitted at the end of June or early in July and shall include all of the work performed during the month of June and Price Adjustments for the work performed in May.

For this example, 1,000 linear feet of 12-inch diameter water main was installed and 400 tons of full-width final bituminous pavement over 1,000 feet of roadway were completed in May. No concrete was installed during the Month of May.

Description	Unit	Base Price	May 2013	June 2013
Diesel Fuel	per gallon	\$3.25	\$3.50	N/A
Gasoline	per gallon	\$3.00	\$3.20	N/A
Hot Mix Asphalt	per ton	\$600.00	\$625.00	N/A
Portland Cement	per ton	\$100.00	\$90.00	N/A

Based on the example Prices in Table 2, an assessment of whether or not Price Adjustments will be paid for this example is presented in Table 3.

Item	Base Price	Period Price	Price Difference	% Change	Price Adjustment Required
Diesel Fuel	\$3.25	\$3.50	\$0.25	7.7%	Yes, >5%
Gasoline	\$3.00	\$3.20	\$0.20	6.7%	Yes, >5%
Hot Mix Asphalt	\$600.00	\$625.00	\$25.00	4.2%	No, <5%
Portland Cement	\$100.00	\$90.00	-\$10.00	-10%	Yes, >5%

As indicated in Table 3, Price Adjustments for this example would be required for Diesel Fuel, Gasoline and Portland cement if work items were performed during the Month of May.

Table 4 presents the Price Adjustment calculations for this example.

Work Item	Quantity	Unit	FUF ¹	Price Difference	Price Adjustment
12-inch Water Main					
Diesel Fuel	1,000	L.F	0.610	\$0.25	\$152.50
Gasoline	1,000	L.F	0.261	\$0.20	\$52.20
Asphalt Hauling/Placement					
Diesel Fuel	400	Ton	1.104	\$0.25	\$210.40
Gasoline	400	Ton	0.502	\$0.20	\$40.16
TOTAL PRICE ADJUSTMENT					\$455.26

1. FUF = Fuel Use Factor

Note: The example indicates that a Price Adjustment will be applied for the payment period for fuel associated with asphalt hauling and placement, but no Price Adjustment would be applied for Hot Mix Asphalt Mixtures as the Price difference for the material was less than 5%. Also, no Price Adjustment is included for Portland cement as no quantity of concrete was completed during the pay period. If concrete had been installed, it would have resulted in a negative Price Adjustment or deduction.

B. Table 5 presents the Fuel Use Factors to be used for this project.

Work Items	Diesel Use Factor	Gasoline Use Factor
Pipe Installation – including excavation, backfill, pipe installation, fittings, valves, insulation, and incidentals	0.610 gal/LF	0.261 gal/LF
Asphalt Pavement – including haul, placement and compaction for trench and sidewalk, and incidentals	2.104 gal/Ton	0.502 gal/Ton
Curbing – including removal, replacement or reinstallation of either asphalt or granite, and incidentals	0.106 gal/LF	0.046 gal/LF
Earth Excavation – including excavation, removal, hauling, disposal, and incidentals	0.207 gal/cy	0.112 gal/CY
Rock Excavation – including ledge and boulder removal and disposal, and material replacement, and incidentals	0.326 gal/CY	0.140 gal/CY
Unsuitable Material Excavation – including excavation and disposal, and material replacement, and incidentals	0.207 gal/CY	0.112 gal/CY
Base Stone – includes hauling, material placement, and incidentals	0.279 gal/Ton	0.279 gal/Ton
Concrete – including production, hauling, placement, and incidentals	0.742 gal/CY	0.715 gal/CY
Fencing – including excavation, hauling, and installation	0.022 gal/LF	0.022 gal/LF

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.
- B. Related work described elsewhere: The Contractor's relations with their subcontractors and materials suppliers and discussions relative thereto, are the Contractor's responsibility and are not part of project meetings content.

1.2 QUALITY ASSURANCE

- A. Persons designated by the Contractor to attend and participate in the project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of project meetings regarding all items to be added to the agenda.
- B. Minutes: The Engineer will compile minutes of each project meeting and will furnish a copy to the Contractor. The Contractor may make and distribute such other copies as they wish.

PART 2 - PRODUCTS

(No products are required in this Section.)

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

- A. Except as noted below for Preconstruction Meeting, project meetings will be held monthly. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

- A. Meetings will be held at the job site in the Engineers' field office, unless the Owner and/or Engineer determine that virtual meetings are applicable and appropriate for any reason (e.g., COVID, Safety and Health Plan, etc.).
 - 1. If meetings are required by Owner/Engineer to be held virtually, Engineer will host the meetings via Microsoft Teams. All required meeting attendees are responsible for providing hardware necessary to view, share, be heard and hear content of the meeting.

3.3 PRECONSTRUCTION MEETING

- A. Preconstruction meeting will be scheduled within twenty days after the Effective Date of the Agreement, but before the Contractor starts work at the site. Provide attendance by authorized representatives of the Contractor and all major subcontractors. The Engineer will advise other interested parties and request their attendance.
- B. Minimum agenda: Distribute data on, and discuss:
 - 1. Identification of key project personnel for Owner, Engineer, Contractor, funding/regulatory Agencies.
 - 2. Responsibilities of Owner, Engineer, Resident Project Representative, Contractor.
 - 3. Channels and procedures for communications.
 - 4. Construction schedule, including sequence of critical work.
 - 5. Easements, permits.
 - 6. Contract Documents, including distribution of required copies of original documents and revisions.
 - 7. Processing of Shop Drawings and other data submitted to the Engineer for review.
 - 8. Processing of field decisions and Change Orders.
 - 9. Rules and regulations governing performance of the Work, including funding/regulatory Agency requirements.
 - 10. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.

3.4 PROJECT MEETINGS

- A. Attendance: To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work. The Superintendent shall attend. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the Work are involved.
- B. Minimum agenda:
 - 1. Review, revise as necessary, and approved minutes of previous meeting.
 - 2. Review progress of the Work since last meeting, including status of submittals for approval.
 - 3. Review schedule of work to be accomplished prior to next meeting.
 - 4. Discuss monthly partial payment request.
 - 5. Review status of change order requests and Work Directive Changes.
 - 6. Identify problems which impede planned progress.
 - 7. Develop corrective measures and procedures to regain planned schedule.
 - 8. Complete other current business.

END OF SECTION

SECTION 01310CONSTRUCTION SCHEDULESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.
- B. Form of Schedules:
 - 1. Narrative: Completely describe the construction methods to be employed.
 - 2. Network Analysis System:
 - a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
 - b. Present in chronological order the beginning of each trade or operation showing duration and float time.
 - c. Scale: Identify key dates and allow space for updating and revision.
 - 3. Mathematical Analysis:
 - a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
 - b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.
- C. Content of Schedules:
 - 1. Provide complete sequence of construction by activity:
 - a. Shop Drawings, Project Data and Samples:
 - i. Submittal dates.
 - ii. Dates reviewed copies will be required.
 - b. Decision dates for:
 - i. Products specified by allowances.
 - ii. Selection of finishes.
 - c. Estimated product procurement and delivery dates.
 - d. Dates for beginning and completion of each element of construction.
 - 2. Identify work of separate phases and logically grouped activities.
 - 3. Show the projected percentage of completion for each item of work as of the first day of each month.
 - 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
 - 5. Schedule sheets shall be printed in color.
- D. Updating:
 - 1. Show all work activities including those already complete.
 - 2. Show all changes occurring since previous submission.
 - 3. Indicate progress of each activity, show completion dates.

4. Include:
 - a. Major changes in scope.
 - b. Activities modified since previous updating.
 - c. Revised projections due to changes.
 - d. Other identifiable changes.
5. Provide narrative report, including:
 - a. Discussion of problem areas, including current and anticipated delay factors.
 - b. Corrective action taken or proposed.
 - c. Description of revisions that may affect schedules.
 - d. Description of activities to be performed in the next 6-week period.
 - e. Updated list of key shop drawings, project data and samples to be submitted in the next 6-week period.

1.2 SUBMITTALS

- A. Submit updated schedules with each progress payment request.
- B. Submit 4 copies of initial and updated schedules to the Engineer.

END OF SECTION

SECTION 01320SAFETY AND HEALTH PLANPART 1 - GENERAL1.1 DESCRIPTIONA. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within 10 days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein. Refer to submittals section below.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, illness, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
 - a. Provide documentation that Contractor's hazardous communication program is up to date.
 - b. Provide documentation that Contractor's safety training is up to date.
 - c. Prepare a project specific Safety and Health Plan addressing construction safety and protection, including but not limited to excavations, fall protection and egress, as well as storage and handling for such things as resins or other chemicals..
2. Safety provisions for confined space entry shall follow the requirements of CFR Title 29 Part 1926, Subpart AA – Confined Spaces in Construction and will be incorporated into the Safety and Health Plan.
3. Safety provisions for excavations and trenching shall following the requirements of CFR Title 29 Part 1926, Subpart P - Excavations and will be incorporated into the Safety and Health Plan.

C. Updating:

1. Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

1.2 SUBMITTALS

- A. Submit the Contractor's site-specific Safety and Health Plan to the Engineer, in accordance with Section 01340. Submit hardcopy submittals, if required.
- B. Submit updated Safety and Health Plans as necessary during the course of the project.
- C. The Safety and Health Plan is provided “for information only” to inform the Owner, Engineer and Resident Project Representative of the project specific safety program requirements; however, if the Safety and Health Plan incomplete (e.g., missing elements relevant to the project work), inadequate (e.g., outdated qualifications) or not project-specific, it will be returned “revise and resubmit”. Delays related to an incomplete Safety and Health Plan are the responsibility of the Contractor.
- D. The Contractor will overview the plan with the Owner (and staff), Engineer and Resident Project Representative prior to work beginning at the project site, and subsequently when/if the safety plan is updated.
- E. Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

1.3 ON-SITE COORDINATION MEETINGS

- A. Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.
- B. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.
- C. Contractor shall hold weekly on-site coordination meetings with Resident Project Representative and Owner to ensure that Owner's staff is aware of key Safety and Health Plan requirements of the current phase of construction.

END OF SECTION

SECTION 01340SUBMITTALSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Submit all shop drawings, operations and maintenance manuals, Manufacturers' certificates, project data, and samples required by the Specifications.
- B. Related Work Specified Elsewhere:
 - 1. Construction Schedules: Section 01310
 - 2. Project Record Documents: Section 01720
 - 3. General Conditions: Section 00700.
- C. Submittals: This project shall utilize:
 - 1. Hard Copy with Electronic Copy
 - a. The Contractor shall submit to the Engineer a minimum of 4 hard copies and one electronic copy of shop drawings and O&M Manuals. The electronic copy shall be in portable document format (PDF) and shall be identical to the hard copy. The Engineer will retain 3 copies (for Owner, Engineer and RPR) and will return 1 hard copy and 1 electronic copy to the Contractor for distribution to subcontractors, suppliers and manufacturers. If the Contractor requires more than 1 returned copy, then the number of copies submitted shall be increased accordingly.
 - 2. Submittals – Electronic via Email/FTP with Hard Copy for Record
 - a. The Contractor shall submit to the Engineer an electronic submittal of shop drawings and O&M Manuals in portable document format (PDF) transmitted via email or file transfer protocol (FTP). The Engineer shall return an electronic PDF of the submittal review comments to the Contractor for distribution to subcontractors, suppliers and manufacturers. The electronic submittals shall serve as the electronic record of the project.
 - b. In addition, completed shop drawings and completed operations and maintenance (O&M) manuals shall be provided in hard copy (paper) format, for the record, in accordance with the following requirements.
 - i. Shop drawings and O&M manuals shall be considered “completed” once an action code of “0” or “1” has been attained, as specified below, unless otherwise directed by the Engineer.
 - ii. Once completed, the Contractor shall provide three hard copy sets (for Owner, Engineer and Resident Project Representative, respectively).
 - iii. Hard copy submittals shall be updated on a monthly basis, for those submittals completed during the preceding month.

1.2 SHOP DRAWINGS

- A. Shop Drawings are required for each and every element of the work.
- B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, their subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.

- C. The Contractor shall provide a completed Contractor Submittal Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of every shop drawing and signed by the Contractor and Manufacturer (where applicable). Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the work.
 - 1. Each shop drawing submittal shall include a complete copy of the relevant specification section markup up to reflect "compliance" or "deviation" on an item-by-item basis.
- D. Shop Drawings shall be submitted as a complete package by specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials and samples associated with each specification section be included as a single submittal for the Engineer's review. Any deviation from this requirement, shall be requested in writing with an anticipated shop drawing breakdown/schedule prior to any associated submittal. An exception to this requirement are shop drawings for reinforcing steel, miscellaneous metals and structural steel, which shall be submitted separately for each structure unless otherwise permitted by the Engineer.
- E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.
- F. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.
- H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from their subcontractors and returning reviewed drawings to them. Shop drawings shall be formatted to standard paper sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 11 inches by 8-1/2 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for resubmittal without being reviewed.
- I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by their subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to confirm that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date,

checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.

- J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in the transmittal. Shop Drawings that contain significant deviations that are not brought to the attention of the Engineer may be subject to rejection.
- K. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, Contractor shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.
- L. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion. Resubmittals for the sole purpose of providing written responses to review comments will not be considered a resubmittal counting towards the two submission limit.
- M. Shop Drawings that include drawings or other material that is illegible or too small may be returned without review.

1.3 SAMPLES

- A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available. Submittals of "samples" shall be documented through the electronic submittal process by including a photograph of the item(s) and indicating the date the sample was mailed and/or delivered.

1.4 OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance (O&M) Manuals are required for certain elements of the project, as specified herein.
- B. The Contractor shall provide a completed Operation and Maintenance Manual Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of every Manual and signed by the Contractor and Manufacturer.
- C. Each hard copy of an O&M Manual shall be provided in a stand-alone binder or shall be suitable for insertion into a 3-ring binder. Include the General Contractor's and Manufacturer's representative's contact information on the front cover. O&M manuals must be appropriate for the project and customized for the project. If a Manufacturer's standard O&M manual is included in the submittal, all non-applicable content must be removed or crossed out.

- D. O&M Manuals shall contain the following operational information:
1. Safety Precautions: List personnel hazards, equipment or product safety precautions for all operating conditions.
 2. Operator Prestart: Include all procedures required to set up and prepare each system, equipment or component for use.
 3. Startup Procedures: Provide a narrative description for all startup operating procedures, include all control sequences.
 4. Shutdown Procedures: Provide a narrative description for all shutdown operating procedures, include all control sequences.
 5. Post-Shutdown Procedures: Provide a narrative description for all post-shutdown operating procedures, include all control sequences.
 6. Normal Operating Procedures: Provide a narrative description of normal operating procedures. Include control diagrams with data to explain operation and control of systems and specific equipment.
 7. Emergency Operations: Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.
 8. Operator Service Requirements: Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, alignment, spare parts installation and gage reading or recording.
 9. Environmental Conditions: Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which the equipment should not be allowed to run.
- E. O&M Manuals shall contain the following maintenance information:
1. Lubrication Data: Include a table showing recommended lubricants for specific temperature ranges and applications. Also, include charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, capacities and a lubrication schedule showing service interval frequency
 2. Preventative Maintenance Plan: Include the manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation as well as to ensure minimization of corrective maintenance and repair. Provide the manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide the manufacturer's specified frequency and procedures for each separate operation.
 3. Troubleshooting Guides: Include recommendations on procedures and instructions for correcting problems and making repairs. Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

4. Wiring and Control Diagrams: Provide Wiring diagrams and control diagrams. All diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to the actual installation numbering.
 5. Maintenance and Repair Procedures: Include instructions and list the tools required to restore products and/or equipment to proper conditions or operating standards.
 6. Removal and Replacement Instructions: Include step-by-step procedures, list required tools/supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.
 7. Spare Parts and Supply Lists: Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration shall be required for facilities at remote locations. List spare parts and supplies that have a long lead times to obtain.
 8. Corrective Maintenance Work Hours: Include the manufacturer's projection of corrective maintenance work-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.
- F. O&M Manuals shall contain the following additional information:
1. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirements to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items.
 - a. When illustrations omit a part number and description, both the illustration and a separate listing shall show the index, reference, or key number which shall cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
 2. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force. Include warranty information for all primary components included in product systems.
 3. Personnel Training Requirements: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

4. Testing and Special Tools: Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.
5. Contractor Information: Provide a list that includes the name, address, and telephone number of the General Contractor and each subcontractor installing the respective product or equipment. Include local representatives and service organizations most convenient to the project site. Provide the name, address, and telephone number of the product or equipment manufacturers.
6. Written confirmation from the manufacturer that the Contractor has coordinated the equipment One Year Service Call in accordance with specification Section 01800, par. 1.1, A, 2.

1.5 MANUFACTURER'S CERTIFICATES

- A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.
- B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.

1.6 SUBMISSION REQUIREMENTS

- A. Accompany submittals with a transmittal cover sheet, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. The sequential shop drawing number for each shop drawing, project data and sample submitted shall be:
 - a. Specification Section number followed by a dash and then a sequential number beginning with 01 (e.g., 16000-01).
 - b. Under limited situations when additional different pieces of equipment are submitted under the same specification section, those submittals shall be numbered sequentially (e.g. 05500-01, 05500-02, 05500-03, etc.).
 - c. Resubmittals shall include an alphabetic suffix after the corresponding sequential number (e.g., 16000-01A).
 - d. O&M submittals shall be numbered with the Specification Section number followed by a dash, the letters "OM", another dash, and then a sequential number beginning with 01 (e.g. 16000-OM-01). Resubmittals of O&Ms shall include an alphabetic suffix after the corresponding sequential number (e.g. 16000-OM-01A).
 5. Notification of deviations from Contract Documents.
 6. Other pertinent data.

- B. A completed Contractor Submittal Certification Form shall be attached to each hardcopy and electronic PDF of each shop drawing and must include:
 - 1. Project name
 - 2. Specification Section and sequential number with alphabet suffix for resubmittal
 - 3. Description
 - 4. Identification of deviations from Contract Documents.
 - 5. Contractor's stamp, initialed or signed, certifying review of the submittal, verification of field measurements and compliance with Contract Documents.
 - 6. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
 - 7. Where specified, manufacturer's guarantee.
- C. Additional Requirements for Electronic Submittals:
 - 1. Each individual shop drawing or O&M submittal shall be contained in one PDF.
 - 2. The first page of the PDF shall be the Contractor Submittal Certification Form as described above.
 - 3. The electronic PDF shall be **exactly** as submitted in the hardcopy.
 - 4. The electronic PDF shall include an electronic table of contents that is bookmarked for each section of the submittal.
 - 5. The electronic PDF shall be configured such that is fully searchable.
 - 6. PDF versions of 24x36 drawings shall be converted to 24 x 36 PDFs so as not to lose the clarity of the original drawing.
 - 7. Electronic PDF submittals that are not submitted in accordance with the requirements stated above will not be reviewed by the Engineer.
 - 8. Electronic submittals shall be transmitted via the protocol established in Part 1 above.

1.7 RESUBMISSION REQUIREMENTS

- A. Revise initial submittals as required and resubmit as specified for initial submittal.
- B. Indicate on submittals any changes which have been made other than those required by Engineer. All renumbering of shop drawings, relabeling of individual pieces or assemblies or relocating of pieces or assemblies to other Drawings within the submittal shall be clearly brought to the attention of the Engineer. If relabeling of individual pieces or assemblies has taken place, the labels from the previous submittal shall be indicated to assist in comparing the original and resubmitted shop drawing.
- C. All resubmittals shall include a summary of the previous submittal review comments with the vendors' written response as to how the previous comments were addressed.

1.8 ENGINEER'S REVIEW

- A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

- B. The Engineer's review comments will be summarized on a Submittal Review Form, which includes an action code. A description of each action code is provided below.
1. No Exceptions Taken (Status 0 on shop drawing log). The shop drawing complies with the Contract Document requirements. No changes or further information are required. Where appropriate, the submittal review form will be used to alert the Contractor, Owner and Field personnel of remaining items within that specification section that still needs to be submitted.
 2. Make Corrections Indicated (Status 1 on shop drawing log). The shop drawing complies with the Contract Document requirements except for minor changes, as indicated. Engineer requires that all comments will be addressed by the Contractor, unless otherwise notified in writing prior to execution of the relevant work.
 3. Conditional to Remarks (Status 2 on shop drawing log). The shop drawing potentially complies with the Contract Document requirements, contingent upon satisfactory resolution of review comments. Remarks will explicitly list what information needs to be resubmitted. Resubmittal from the Contractor should include a cover letter or summary which indicates how each review comment has been addressed. **This action code will not be used, or will be sparingly used, for electronic submittals.**
 4. Revise and Resubmit (Status 3 on shop drawing log). The shop drawing does not comply with the Contract Document requirement as submitted, but may with changes indicated and/or submission of additional information. The entire package must be resubmitted with the necessary information and a cover letter which indicates how each review comment has been addressed and where to find the information in the resubmittal.
 5. Rejected (Status 4 on shop drawing log). The shop drawing does not comply with the Contract Document requirements, for the reasons indicated in the remarks, and is unacceptable.
 6. For Information Only (Status 5 on shop drawing log). The shop drawing review was for information only.
 7. In Review (Status 6 on shop drawing log). The shop drawing is currently under review.

CONTRACTOR SUBMITTAL CERTIFICATION FORM

PROJECT: _____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR: _____ ENGINEER'S PROJ. NO: _____

ENGINEER: _____

SHOP DRAWING NUMBER:	SPECIFICATION SECTION OR DRAWING NO:	SEQUENTIAL NUMBER (& ALPHA SUFFIX FOR RESUBMITTAL)
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DESCRIPTION: _____

MANUFACTURER: _____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

- NO DEVIATIONS
- or
- A COMPLETE LIST OF DEVIATIONS AS FOLLOWS^a:

By: _____ By: _____
Contractor^b

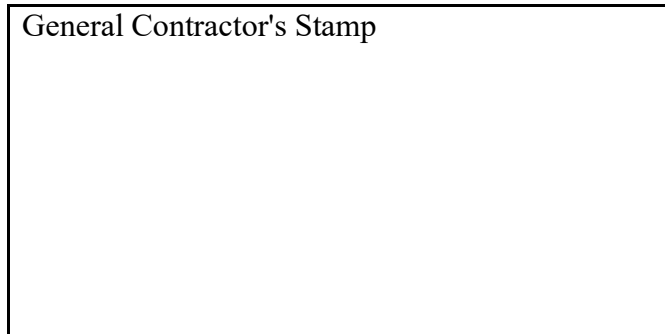
Manufacturer^c

Date: _____ Date: _____

a Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

b Required on all submittals

c When required by specifications Page ___ of ___



OPERATIONS AND MAINTENANCE MANUAL CERTIFICATION FORM

PROJECT: _____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR: _____ ENGINEER'S PROJ. NO: _____

ENGINEER: _____

	- OM -	
O&M NUMBER:	SPECIFICATION SECTION OR DRAWING NO:	SEQUENTIAL NUMBER (& ALPHA SUFFIX FOR RESUBMITTAL)

DESCRIPTION: _____

MANUFACTURER: _____

The above referenced operations and maintenance manual has been reviewed by the undersigned and I/we certify that the manual is customized as needed for this project, is suitable for mounting in a 3-ring binder, and contains the following items:

- | | |
|--|--|
| <input type="checkbox"/> Table of Contents | <input type="checkbox"/> Project-Related Design Data |
| <input type="checkbox"/> Contractor and Manufacturer Contact Information | <input type="checkbox"/> Serial Numbers |
| <input type="checkbox"/> Preventative Maintenance Schedule and Summary | <input type="checkbox"/> Maintenance and Repair Procedures |
| <input type="checkbox"/> Removal and Replacement Instructions | <input type="checkbox"/> Wiring and Control Diagrams |
| <input type="checkbox"/> Lubrication Schedule | <input type="checkbox"/> Equipment Drawings & Schematics |
| <input type="checkbox"/> Troubleshooting Information | <input type="checkbox"/> Equipment Performance Curves |
| <input type="checkbox"/> Warranty Information | <input type="checkbox"/> Parts and Service Contact Information |
| <input type="checkbox"/> Rebuild Information for All Components | <input type="checkbox"/> Manufacturer's Contact Information |
| <input type="checkbox"/> Startup, Operation and Shutdown Procedures | <input type="checkbox"/> Emergency Operations Plan |
| <input type="checkbox"/> Normal and Emergency Operations | <input type="checkbox"/> List of All Component Part Numbers |
| <input type="checkbox"/> Safety Procedures and Precautions | <input type="checkbox"/> List of Spare Parts Supplied |
| <input type="checkbox"/> Shop Drawings corrected to As-Built Conditions | <input type="checkbox"/> Testing Equipment & Special Tools |
| <input type="checkbox"/> Personnel Training Requirements | <input type="checkbox"/> Other System Specific Information |

By: _____ By: _____
Contractor^a Manufacturer^b

Date: _____ Date: _____

^a Contact information shall include name, address and telephone number.

^b Required on all Operation and Maintenance Manuals.

^c When required by Specifications. Page ___ of ___

General Contractor's Stamp

END OF SECTION

SECTION 01380CONSTRUCTION PHOTOGRAPHSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Pre-Construction Record: Contractor shall take digital photographs and video to obtain a visual record of the project area prior to beginning any work at the project site.
2. Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at their option, observe.

1.2 QUALITY

- A. Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, walls, doors, equipment, piping, etc. can be readily determined.

1.3 SUBMITTAL OF PRINTS

A. Pre-Construction Record:

1. Submit pre-construction photographs/videos in accordance with Section 01340 prior to initiating any work on-site.
- B. The quality of the photos and video are subject to approval by the Engineer.
- C. Photographs and videos taken for the project and submitted are released to the Owner and Engineer for reproduction and use for records retention, governmental and commercial purposes.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Manufacturer's Field Services.
- F. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

- A. Section 00700 - General Conditions: Inspection and testing required by governing authorities.
- B. Section 01340 - Submittals: Submittal of Manufacturer's Instructions
- C. Section 02200 - Earthwork

1.3 QUALITY CONTROL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

- A. When required by individual Specifications Section, submit manufacturer's certificate that products meet or exceed specified requirements.

1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in respective Specification Sections, require supplier and/or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.
- B. Representative shall submit written report to Engineer listing observations and recommendations.

1.8 TESTING LABORATORY SERVICES

- A. The Contractor will employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services wherever an Independent Testing Laboratory is required by individual specification sections listed in paragraph 1.2 above, unless otherwise indicated.
- B. Services will be performed in accordance with requirements of governing authorities and with specified standards.
- C. Reports will present observations and test results and indicate compliance or non-compliance with specified standards and with Contract Documents. Independent Testing Laboratory will submit one copy of each report directly to each of the following: Engineer, Resident Project Representative, Owner, Contractor. Reports will be submitted within 5 days of obtaining test results. If test results indicate deficiencies, Independent Testing Laboratory shall telephone or email results to Engineer, Resident Project Representative, Owner, and Contractor within 24 hours.
- D. Contractor shall cooperate with Independent Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
- E. Contractor shall coordinate all testing work and shall notify Engineer and Independent Testing Laboratory at least 24 hours prior to performing work requiring testing services. If scheduled tests or sampling cannot be performed because the work is not ready as scheduled, testing costs associated with the delay will be paid for by the Contractor and at no additional cost to the Owner.
- F. Payment for Independent Testing Laboratory services shall be as follows:
 - 1. Independent Testing Laboratory services shall be considered incidental to the overall contract. No separate payment will be made for these services.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01500TEMPORARY FACILITIES AND CONTROLSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS2.1 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards, fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.
2. Use new or used materials adequate in capacity for the purposes intended.
3. Materials must not create unsafe conditions or violate the requirements of applicable codes.

4. Conductors
 - a. Wire, cable or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
 - b. Use only UL approved wire.
 5. Conduit:
 - a. Rigid steel galvanized: ANSI C80.1.
 - b. Electrical metallic tubing: ANSI C80.3.
 - c. Other material approved by NEC.
 6. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
 7. Temporary power shall be based upon the following minimum requirements:
 - a. Lighting - 300 watt per 1,000 square feet of floor area.
 - b. Receptacles - One 15 ampere duplex for 1,000 square feet of floor space.
 - c. Special Construction Equipment - Provide one 30-amp, 2-pole fused switch for equipment connection. The cost for cables and connection from switch to the special equipment will be borne by the Sub-Contractor requiring same.
 8. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of temporary wiring of a special nature for light and power required, other than that above mentioned.
 9. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.
- B. Water and Sanitary:
1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at their own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
 2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
 3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for their employees.
 4. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.

5. Relocate temporary toilet facilities as required to facilitate the construction.
6. Remove all temporary facilities at completion of work when directed by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Electrical:

1. Provide electrical energy to:
 - a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
 - b. Construction site offices.
 - c. Lighting as required for safe working conditions at any location on the construction site.
 - d. Night security light.
 - e. When applicable, Owner's present facilities during the changeover of electrical equipment.
2. Maintain electrical energy throughout the entire construction period.
3. Capacity:
 - a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.
4. Installation:
 - a. Install all work with a neat and orderly appearance.
 - b. Have all installations performed by a qualified electrician.
 - c. Modify service as job progress requires.
 - d. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.

B. Water:

1. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.

C. Sanitary Accommodations:

1. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.
2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SECTION 01515TEMPORARY FORCE MAIN BYPASS SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

- A. The Contractor shall design, furnish, install, test, operate, maintain and remove temporary bypass pumping system from the Narrows Pump Station to the headworks at the WPCF. Temporary bypass pumping system(s) shall be fully automated and able to reliably convey the all raw, untreated wastewater flows from the Narrows Pump Station as required for the work.
- B. The Contractor shall coordinate temporary bypass with the Owner and Engineer. The Contractor is required to report any failure of the bypass system immediately to the Owner.
- C. Additional Requirements Specified Elsewhere:
 - 1. Summary of Work: Section 01010
 - 2. Submittals: Section 01340
 - 3. Sewer Line Cleaning, Television Inspection of Sewers, Final Sewer Testing: Division 2

1.2 QUALITY ASSURANCE

- A. All system components specified herein shall be furnished by a Supplier who regularly engages in temporary bypass pumping systems. Supplier shall have a minimum of 15 years of experience with temporary bypass pumping systems. Supplier shall provide at least 5 references of project of a similar size and complexity as this project that have been performed within the past 5 years within New England.
- B. Supplier shall have sufficient equipment and spare parts inventory to perform normal rentals, including this project, and maintain at least 100% reserve equipment for this project for immediate delivery. Supplier shall have sufficient service personnel to provide service calls within 4 hours, 24 hours per day, 7 days per week.
- C. Temporary bypass pumping systems shall be:
 - 1. Godwin Pumps, Manchester, New Hampshire;
 - 2. Baker Corp, Oxford, Massachusetts;
 - 3. or equal.
- D. A qualified representative of the Supplier shall inspect the installation and supervise the startup and testing of the temporary bypass pumping system.
- E. The temporary bypass pumping system shall meet all applicable local, state and federal requirements.
- F. The temporary bypass pumping system shall be designed by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts. Compliance with this requirement shall be demonstrated via a signed and sealed submittal package, as specified herein.

1.3 SUBMITTALS

- A. In accordance with the requirements of Section 01340.

1. Qualifications information.
2. Proposed sequence of construction.
3. Temporary bypass plan (brief narrative).
4. Coordination Drawings showing detailed layout of equipment, piping, fittings, valves, supports, and materials provided under this section. Provide catalog cut sheets and technical data for equipment and appurtenances.
5. List of standby equipment and spare parts available on-site and off-site.
6. Description of maintenance procedures to be used.
7. Names of individuals responsible for on-call emergency response, 24 hours per day, 7 days per week. List personnel in call-order.

PART 2 - PRODUCTS

2.1 WASTEWATER BYPASS PUMPING SYSTEM

A. Pumping Equipment:

1. Temporary bypass pumping system(s) shall be designed to convey the full range of flows and head conditions as scheduled herein.

NARROWS PUMP STATION	
Duty	Raw unscreened sewage
Duty Pumps	
Standby Pumps	Electric
Variable Speed Required for Duty Pumps	Yes
Flow	7,240 gpm

2. Each pump shall be a skid-mounted unit. The pump system may utilize available on-site manholes, junction/splitter structures, and/or tankage for suction and discharge, as appropriate.
3. The pumps shall be centrifugal pumps suitable for handling raw, unscreened sewage with solids up to 3 inches in diameter, and capable of running completely dry for extended periods of time without damage.
4. The pump priming system shall be fully automatic, needing no form of adjustment or manual addition of water. The priming system shall be capable of priming the pump from a completely dry casing.
5. All pumps shall be critically silenced to less than 68 decibels at 25 feet.
6. Contractor shall provide appropriately sized portable spill guard containment dikes to contain leaks resulting from the pumping system, from the fuel storage tanks(s) and/or from the pumps and process piping within 5 feet of the system.

B. Piping

1. Suction piping and discharge piping shall be constructed of:
 - a. Rigid galvanized steel pipe with ball and socket joints, Bauer HK Quick Coupling Piping or equal.
 - b. Fused HDPE piping
 - c. Connection to existing piping shall be made equivalent materials.
2. Aluminum "irrigation" type piping or glued PVC pipe shall not be allowed.

- C. Controls and Alarms
1. The pump set shall be furnished with a weather-proof automatic control system consisting of floats and/or transducer level controls.
 2. The controller shall start/stop the pumps based on signals from high and low level floats or a transducer. The controller shall be capable of automatically varying the pump speed to match varying flow conditions and maintain a constant suction level, if scheduled herein.
 3. The controller shall annunciate and log all alarm conditions including but not limited to high upstream water level, duty pump failure, utility power loss and standby pump failure. The alarm log shall include the type of alarm, time of alarm, time alarm acknowledged, and time alarm condition cleared. Annunciation shall be via teledialer, two-way radio, cellular telephone, or equivalent.

PART 3 - EXECUTION

3.1 COORDINATION OF WORK

- A. Provide all labor and equipment necessary to coordinate work of this section and maintain communications.
- B. Notify all personnel, including but not limited to Owner, Engineer and Utility Companies, seven days in advance of any temporary bypass pumping work. The Owner will identify personnel to be notified in addition to those identified by the Contractor.
- C. Contractor shall coordinate temporary bypass pumping operations with the Owner and Engineer on a daily basis.

3.2 PERFORMANCE:

- A. General
 1. The Contractor shall install and test all sewer flow control methods to the satisfaction of the Owner and Engineer prior to proceeding with the Work.
 2. The Contractor shall be solely responsible for clean-up, repair, property damage costs and claims resulting from failure of the diversion system.
 3. Any temporary pumps, piping, fuel storage, or other appurtenances associated with the temporary pumping system shall be either located above the 100-year flood elevation or protected against flotation or other damage which would be caused by a flood event.
- B. The temporary bypass pumping system shall be furnished, installed, tested, operated, maintained and removed as follows:
 1. The Contractor shall furnish, install, and test temporary bypass pumping system and discharge pipelines.
 2. The Contractor shall test and debug all systems and verify that all necessary equipment, materials, spare parts, and labor are available on-site prior to operation of the system and prior to the demolition of any part of the existing pumping station facilities.
 3. The Contractor shall operate and maintain the system until the new Work is completed, demonstration tested and accepted by the Owner and Engineer.

4. Contractor shall be responsible for making regulatory reporting notifications for any release of wastewater or fuel to the environment. Contractor shall provide copies of notifications to the Owner and Engineer. Massachusetts DEP 24-hour spill reporting is at 1-888-304-1133.
 5. The Contractor shall anticipate that the Owner will require 7 calendar days of operation on the new, permanent Work following satisfactory completion of demonstration testing prior to beginning disassembly of the temporary bypass pumping system.
 6. Upon receipt of approval by the Owner and Engineer, the Contractor shall disassemble and remove the temporary bypass pumping system, including all appurtenant piping. Contractor shall restore the area impacted by the temporary bypass pumping system to a like-new condition.
- C. Contractor shall be responsible for cleanup, repairs, restoration and fines required to address spills or overflows from a failed bypass pumping system.

END OF SECTION

SECTION 01562DUST CONTROLPART 1 - GENERAL1.1 DESCRIPTIONS

A. Work Included:

1. Furnish and apply water on the road surfaces within the construction site, when required to control dust and when directed by the Engineer.
2. When dust control is not included as a separate item in the Contract, the work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS2.1 MATERIALS

A. Water for Sprinkling:

1. Clean, free of salt, oil, and other injurious matter.

PART 3 - EXECUTION3.1 APPLICATION

A. Water:

1. Apply water by methods approved by the Engineer.
2. Use approved equipment including a tank with gauge equipped pump and spray bar.

END OF SECTION

SECTION 01570TRAFFIC REGULATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
 - 2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
 - 3. Do not close roads or streets to passage of the public without the permission of the proper authorities.
- B. The local police department will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage.
- C. Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.
- D. Develop a project specific traffic control plan that meets the requirements of Manual of Uniform Traffic Control Devices (MUTCD) and any local and state requirements. Proposed Traffic Control Plan shall indicate signs/locations to be used. Traffic Control Plan submittal to the Engineer will be for general information only.
- E. The Contractor's designated traffic control representative shall respond to all traffic safety complaints and be available to direct traffic control subcontractors the entire time work is occurring on site. If the designated representative is not on site for a period of time, another on site representative shall be designated by the Contractor for that period.

1.2 SCHEDULING WORK

- A. During the Project Pre-Construction Meeting one Contractor representative will be designated as the coordinator between the Police Department and subcontracted traffic control.
- B. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.
- C. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour.
- D. Do not start work in any new location without the permission of the Engineer.
- E. Notify all police and fire departments of all scheduled detours and when streets are reopened.

PART 2 - PRODUCTS2.1 WARNING SIGNS AND BARRICADES

- A. Traffic control (plans, methods and devices) shall be as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as published

- by U. S. Department of Transportation, and any local and state requirements.
- B. Provide adequate warning signs, barricades, signal lights, flaggers/uniformed police officers, and take other necessary precautions for the safety of the public.
 - C. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
 - D. Provide signs at appropriate locations as determined by the local police department to maintain safe passage of traffic and work zone.
 - E. Provide barricades of substantial construction and painted with a finish that increases visibility at night, as outlined in the MUTCD.
 - F. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
 - G. Maintain all necessary signs, barricades, lights, crew, and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.
 - H. Contractor shall make periodic inspection throughout the day of the traffic control patterns, methods, signs and other devices to ensure that they are properly placed.

2.2 UNIFORMED POLICE OFFICER

- A. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.
- B. Arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

PART 3 - EXECUTION

3.1 DETOURS

- A. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.
- B. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever a traveled way is closed, perform the Work in such a manner that local travel, residents and businesses in the vicinity of the Work will be inconvenienced as little as possible.
- B. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

3.3 TRAFFIC CONTROL OFFICERS

- A. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.
- B. Where the local, county or state police departments do not wish to or are unable to furnish traffic control officers and/or when specified, the traffic control officers shall be flag person.

END OF SECTION

SECTION 01710
PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
2. At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Cleaning During Construction:

1. Execute cleaning operations to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
2. Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
5. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw material from heights.

- B. Control of Hazards:
 - 1. Store volatile wastes in covered metal containers and remove from premises daily.
 - 2. Prevent accumulation of wastes which may create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Disposal:
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.
- D. Final Cleaning:
 - 1. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
 - 2. Repair, patch and touch up marred surfaces to specified finishes.
 - 3. Broom clean paved surfaces.
 - 4. Rake clean non-paved surfaces of the project site.
 - 5. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION

SECTION 01720PROJECT RECORD DOCUMENTSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Keep accurate record documents for all additions, demolition, changes of material or equipment (from that shown on the Drawings), variations in work, and any other additions or revisions to the Contract (via Change Order, Work Change Directive, Field Order or Clarification).
- B. Related Work Specified Elsewhere:
 - 1. Shop Drawings, Project Data, and Samples are specified in "General Conditions" and Section 01340, Submittals.

1.2 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Change Orders
 - 6. Any other modifications to the Contract
 - 7. Field Test Reports
- B. Store documents in files and racks specifically identified for Record Drawing use, that are apart from documents used for construction.
- C. File documents in a logical manner indexed for easy reference.
- D. Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.
- G. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests.

1.3 RECORDING

- A. Label each document "PROJECT RECORD" in large high printed letters.
- B. Keep record documents current and do not permanently conceal any work until required information has been recorded.
- C. General Field Recording Issues:
 - 1. All swing ties shall be taken from existing, permanent features such as utility poles, corners of buildings and hydrants. Porches, sheds or other house additions shall be avoided as they could be torn down. A minimum of two swing ties shall be taken. Survey grade GPS coordinates are also acceptable.
 - 2. Stations shall be recorded to the nearest foot.
 - 3. Inverts shall be recorded to the nearest hundredth of a foot.
 - 4. Elevations shall be recorded to the nearest hundredth of a foot.

5. Building dimensions shall be recorded to the nearest 1/4".
 6. Equipment and Piping shall be recorded to the nearest tenth of a foot, and the overall dimensions and layout of the equipment shall be adjusted to reflect the equipment provided.
- D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):
1. Existing Utilities
 - a. Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be required.
 - b. Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties shall be shown on plan. Utility shall be drawn to scale in section (horizontally and vertically) and an elevation shall be called out to the nearest hundredth of a foot.
 - c. When existing utility lines are broken and repaired, ties shall be taken to these locations.
 - d. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
 2. Manholes, Catch Basins, Valve Pits and other structures.
 - a. Renumber structure stationing to reflect changes.
 - b. Show ties to center of structure covers or hatches.
 - c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
 - d. Show inverts for other structures at the face of the structure.
 - e. Draw any new structures that are added on plan and profile.
 - f. Show any field or office redesigns.
 - g. Redraw plan if the structure's location is moved more than 5 feet in any direction. Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.
 - h. Redraw profile if inverts changed by more than 6 inches.
 3. Gravity Sewer Line
 - a. Change sewer line slopes indicated on Drawings if inverts are changed.
 - b. Draw any new gravity lines that are added on plan and profile.
 - c. Show any field or office redesigns.
 - d. Redraw the sewer line profile if manhole inverts are redrawn.
 - e. Redraw the sewer line on plan corresponding to relocated manholes.
 4. Water Mains and Force Mains
 - a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks shall be recorded.
 - b. Revise elevations indicated on the Drawings to reflect actual construction.
 5. House Services
 - a. Draw all house services (even to empty lots) on plan and show ties.

- b. Show ties or distances to wyes from manhole.
 - c. Show chimneys heights in the profile.
 - d. The Wright-Pierce "Sanitary Sewer Service Location" forms and "Water Service Location" forms shall be used to record sewer and water service information. A copy of these forms shall be provided to the Owner, along with the Record Drawing Set.
6. Ledge
 - a. Ledge profiles shall be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.
 7. Yard Piping and Buried Electrical Conduit
 - a. Site piping and utilities shall be drawn to reflect the installed locations, with ties and elevation of all bends (horizontal and vertical).
 8. Utilities
 - a. When encountered, additional utilities (e.g., gas, cable, telephone, fiber optic, etc.) shall be indicated on the Record Drawings.
- E. Specifications and Addenda - Legibly mark up each section to record:
1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 2. Changes made by Change Order, Field Order, or other method.

1.4 SUBMITTALS

- A. At the completion of the project, and prior to the release of retainage, deliver record documents to the Engineer.
1. Record drawings shall be provided as a bound, red-line paper set and an electronic file (pdf format) consisting of a full scan of the bound paper set.
 2. Record drawings shall be provided as a bound paper set of computer generated drawings, an electronic file (pdf format) of the bound paper set, and electronic files in AutoCAD format. Ownership of the drawings and files shall pass to the Owner at the time of submittal.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
1. Date, project title and number.
 2. Contractor's name and address.
 3. Title and number of each record document with certification that each document is completed and accurate.
 4. Signature of Contractor, or their authorized representative.
- C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in withholding final completion and in non-approval of final payments of the Contract. If Contract Time has elapsed, this shall be grounds for imposing liquidated damages.

1.5 QUALITY ASSURANCE

- A. All horizontal and vertical dimensions, swing-ties, and elevations shall be accurate to within one-tenth of a foot, unless greater accuracy is specified elsewhere in the Specifications (e.g., concrete elevations, weir elevations, etc.).

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.1 MAINTAINING AND PROVIDING RECORDS

- A. Records shall be kept current as the work progresses.
- B. Records shall be made available for review by the Owner, Engineer, Resident Project Representative and/or Funding Agency(s) upon request.
- C. Records shall be kept current as the work progresses. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests. Failure to provide records shall also be grounds for withholding of final payment and, if beyond contract time, shall be grounds for imposing liquidated damages.

3.2 AS-BUILT SURVEY PERFORMANCE

- A. From established survey control, and construction baseline as shown on the drawings, conduct surveys of the project area during construction as needed to obtain information of buried and above ground items. Surveys shall include information outlined in Section 1.3.
- B. Actual road alignments; walls; fence and guardrail; existing, new and relocated utility poles; traffic and warning sign locations; crosswalks, parking space and stop bar locations; retaining walls and foundations drains; all underground and overhead utility poles and lines within the project limits, including those installed on private property; all other new features and appurtenances and those existing features and appurtenances changed as a result of this project shall be included in the survey.

3.3 FORMAT FOR ELECTRONIC DELIVERABLES

- A. AutoCAD digital survey data for the as-built survey shall include:
 - 1. Copy of field notes and sketches of the survey.
 - 2. Paper copy of description of layers.
 - 3. Paper copy of base map.
 - 4. Provide digital information on compact disk with paper copy printout; information shall be provided in .DWG format. Data shall be provided in 3D format (northing, easting, elevation, or Y, X, Z).
 - 5. Drawing scale: Minimum one inch = twenty feet.
 - 6. Layering:
 - a. Repetitive symbols made into blocks and defined on layer 0.
 - b. All entities shall be drawn “by layer” as opposed to individual properties.
 - c. Use one linetype and one color per layer as opposed to numerous colors/linetypes on a single layer.
 - d. Preface each layer with the initials of the Survey company or Contractor (example, Survey Company: SC “layername”).
 - e. Database text annotation will be coordinated so the text will be right-reading.
 - f. Place text on separate layers.

SANITARY SEWER SERVICE LOCATION

Project:	_____	Date:	_____
Date Installed:	_____	Town, City of:	_____
Type, Size of Service Pipe	_____	Street	_____
Connection at Sewer Main	_____	Dwelling No.	_____
Depth, End of Service	_____	Occupant	_____
Length of Service Pipe	_____	Owner	_____
Laid	_____		_____
Measured, Located By	_____	House No.	_____
Project Contractor	_____	Complete	_____
		Incomplete	_____

N.T.S.

Comments: _____

Observed By:

_____	_____
Contractor	(Date)
_____	_____
Wright-Pierce	(Date)

END OF SECTION

SECTION 02050DEMOLITIONPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall furnish all labor, materials, tools, equipment and apparatus necessary and shall do all work required to complete the demolition, removal, and alterations of existing facilities as indicated on the Drawings, as herein specified, and/or as directed by the Engineer.
2. Demolition and alteration work within occupied areas shall be accomplished with minimum interference to the occupants and to the plant which shall be in continuous operation during construction.
3. All equipment, piping, and other materials that are not to be relocated or to be returned to the Owner shall become the property of the Contractor and shall be disposed of by him, away from the site of the work and at his own expense.
4. All demolition or removal of existing structures, utilities, equipment, and appurtenances shall be accomplished without damaging the integrity of existing structures, equipment, and appurtenances to remain, to be salvaged for relocation or stored for future use.
5. Such items that are damaged shall be either repaired or replaced at the Contractor's expense to a condition at least equal to that which existed prior to the start of his work.
6. Unless otherwise indicated, all items labeled to be "removed", "demolished" or "remove/demolish" shall be removed and disposed of off site in accordance with all Local, State and Federal Regulations.
7. The Contractor shall not collect any samples of either Building Materials, Wastes, Soils, or any other site/project related materials, nor have the samples analyzed for any reason without prior written approval from the Owner or Engineer. Furthermore, the Contractor shall not hire or contract with another party or Consultant to conduct sampling of either Building Materials, Wastes, Soils, or any other site/project related materials or to conduct analytical analysis.
 - a. All sampling requests are to be directed in written format to the Owner and Engineer.
 - b. By collecting unauthorized samples, the Contractor shall assume any and all financial burden of the required corrective action.
 - c. If a sample is collected and analyzed without prior written approval from the Owner or Engineer, the Contractor shall be responsible for any and all remediation required by any applicable regulatory authority arising from or related to the samples collected and analyzed, as the validity of the materials sampled, sample locations and sampling protocols utilized cannot be confirmed by the Owner's or Engineer's independent Consultant.

- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Earthwork is specified in Section 02200.
 - 2. Use of Explosives is specified in Section 01546.
 - 3. See Summary of Work, Section 01010.

1.2 JOB CONDITIONS

- A. Condition of Structures:
 - 1. The Owner assumes no responsibility for the actual condition of structures to be demolished.
 - 2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as practicable. However, variations within the structures may occur due to Owner's removal and salvage operations prior to the start of demolition work (where applicable).

1.3 UTILITIES

- A. Utility Locations:
 - 1. Utility locations shown on the plans are approximate only, based on information supplied by the utility companies.
- B. Coordination with Utilities:
 - 1. The Contractor shall make all necessary arrangements and perform any necessary work to the satisfaction of affected utility companies and governmental divisions involved with the discontinuance or interruption of affected public utilities and services.

1.4 SUBMITTALS

- A. Schedule - Demolition:
 - 1. Submit two (2) copies of proposed methods and operations of demolition to the Engineer for review prior to the start of work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required.
 - 2. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations.

1.5 PROTECTIONS

- A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons. Erect temporary, covered passageways as required by authorities having jurisdiction.
- B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.6 DAMAGES

- A. The Contractor shall promptly repair damages caused by demolition operations to adjacent facilities at no cost to the Owner.

PART 2 - PRODUCTS – Not Applicable

PART 3 - PERFORMANCE

- A. Remove and dispose of non-salvageable material in accordance with all applicable local and state laws, ordinances and code requirements.
- B. Dispose of material daily as it accumulates.
- C. Carefully remove, store and protect from damage all materials to be salvaged.
- D. Buildings and Adjacent Property:
 - 1. Protect all buildings and property adjacent to equipment to be removed from damage by erecting suitable barriers or by other suitable means.
 - 2. Leave such buildings in a permanently safe and satisfactory condition.
- E. Maintaining Traffic:
 - 1. Ensure minimum interference with roads, streets, driveways, sidewalks and adjacent facilities.
 - 2. Do not close or obstruct streets, sidewalks, alleys or passageways without permission from authorities having jurisdiction.
- F. Architectural, structural, mechanical, process and electrical demolition, removal and alteration are indicated in the corresponding sections.
- G. Mechanical/Process Demolition:
 - 1. Mechanical/Process demolition in general shall consist of the dismantling and removal of existing piping, tanks, pumps, motors, equipment and other appurtenances as specified, and indicated on the Drawings.
 - 2. It shall also include, where necessary, the cutting of existing piping for the purpose of making connections thereto.
 - 3. Piping not indicated to be removed but which may interfere with construction shall be removed to the nearest solid support, capped and left in place. Where piping that is to be removed passes through the wall of existing structures, it shall be cut off and properly capped on each side of the wall.
 - 4. When piping is to be altered or removed underground, the remaining piping shall be properly capped or plugged.
 - 5. Abandoned underground piping shall be left in place unless it interferes with new structures or unless otherwise noted on the Drawings.
- H. Salvage:
 - 1. Salvaged items shall be stored on site for the Owner in an acceptable location and manner.
- I. Treatment Structure Cleaning: (unless indicated otherwise on the Drawings):
 - 1. Contractor shall give Owner 14 days minimum notice prior to beginning work in structures requiring draining and cleaning; which are to be renovated or cleaned as part of this project. The Owner will be responsible for removal and disposal of the liquid contents of the existing structures.
 - 2. When the existing treatment structures are empty of liquid (drained by the Owner), any solids and/or debris remaining that are not easily drained by the Owner as part of normal facility operations shall be the responsibility of the Contractor. Contractor shall remove and dispose of all grit, sludge, rags, solids and/or debris within the treatment structures at the unit cost identified in the Bid Form. The Contractor shall then clean the structure walls, floor and ceiling

using a high-pressure steam cleaning device. The cleaning once debris is removed from the structure is not included in the unit cost item.

3. If the demolition work does not commence within the Contractor's approved project schedule, the structures may be placed back in operation by the Owner. It will then be the Contractor's responsibility to drain and clean the structures.
- J. Maintain Treatment:
1. During demolition, maintain treatment as outlined in Section 01010, Summary of Work.
- K. Demolition Sequence:
1. The demolition sequence is to conform the reviewed and approved project schedule, and restrictions outlined in Section 01310, Construction Schedules.
- L. Pest Control:
1. Provide pest control when needed or when directed by the Engineer.
 2. Exterminate and prevent migration of rodents to adjoining buildings in accordance with the requirements of the state or local health department.

END OF SECTION

SECTION 02110CLEARING AND GRUBBINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Clearing and grubbing includes, but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, posts, signs, fences, culverts and other vegetation and minor structures; the protection of designated wooded growth; the storage and protection of minor structures and materials which are to be replaced; and the disposal of nonsalvageable structures and materials, and necessary preliminary grading.

B. Limits of Work:

1. Perform clearing and grubbing work within the areas required for construction, to a depth of 12 inches below the existing grade.
2. Perform additional clearing and grubbing work within areas and to depths which, in the opinion of the Engineer, interfere with excavation and/or construction, or are otherwise objectionable.

C. Work Not Included:

1. Clearing and grubbing work performed for the convenience of the Contractor will not be considered for payment.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Dispose of combustible material by burning only when permitted by and in accordance with all applicable local and state laws, ordinances and code requirements.

B. Remove and dispose of nonsalvageable structures and material in accordance with all applicable local and state laws, ordinances and code requirements.

PART 2 - PRODUCTS2.1 MATERIALS

A. Provide all materials required to complete the work.

B. All timber and wood shall become the property of the Contractor unless other agreements are made between the Owner and the Contractor.

C. Repair any damage to structures to the complete satisfaction of the Owner and Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Carefully preserve and protect from injury all trees and/or shrubs not to be removed.
- B. Right-of-way:
 - 1. Where excavation is required on public or private rights-of-way containing trees, shrubs, other growth, or any structure or construction, obtain the Engineer's direction concerning the extent to which such obstacles can be cleared or stripped prior to performing the Work.
 - 2. In all rights-of-way, remove only those particular growths or structures which are, in the opinion of the Engineer, essential for construction operations.
 - 3. All other removals or damage shall be replaced or restored at the Contractor's expense.

3.2 PERFORMANCE

- A. Clearing:
 - 1. Remove and dispose of all trees, brush, slash, stubs, bushes, shrubs, plants, debris and obstructions within the area to be cleared, except any areas that may be designated as "Selective Clearing", and except as otherwise shown on the Drawings or as directed by the Engineer.
 - 2. Remove all stumps unless otherwise directed by the Engineer.
 - 3. Dispose of material to be removed daily as it accumulates.
 - 4. Take special care to completely dispose of all elm trees and branches immediately after cutting either by burial in approved locations or, when permitted, by burning in areas well removed from standing elm growth.
- B. Protection of Wooded Growth:
 - 1. Fell trees toward the center of the area being cleared to protect trees and shrubs to be left standing.
 - 2. Cut up, remove and dispose of trees unavoidably falling outside the area to be cleared.
 - 3. Employ skilled workers or tree surgeons to trim and repair all trees that are damaged but are to be left standing.
- C. Selective Clearing:
 - 1. When shown on the Drawings and when directed by the Engineer, perform selective clearing work to preserve natural tree cover.
 - 2. Perform selective clearing work only under the direction and supervision of the Engineer.
 - 3. Remove all dead and uprooted trees, brush, roots and other material which, in the opinion of the Engineer, are objectionable.
 - 4. Cut flush with the ground and remove only those trees indicated by the Engineer.
 - 5. Employ skilled workmen or tree surgeons to carefully trim all branches requiring cutting on trees to be left standing. Wood exposed as the result of removal of branches is to be left exposed to air and sunlight.
 - 6. Bituminous paint shall not be used on wood exposed as a result of branch removal, excavation around roots, or damage to tree bark.

- D. Grubbing:
 - 1. Perform grubbing work beneath new roads, driveways, walks, seeded areas and other areas and as directed by the Engineer.
 - 2. Grub out all sod, vegetation and other objectionable material to a minimum depth of 12 inches below the existing grade.
 - 3. Completely remove all stumps, including major root systems.
- E. Disposal:
 - 1. Remove from the site and dispose of material not being burned.
 - 2. Provide an approved disposal area unless otherwise specified.
- F. Burning:
 - 1. Dispose of combustible materials by burning, only if approved by local and state officials.
 - 2. Employ competent workers to perform burning work in such a manner and at such locations that adjacent properties, trees and growth to remain, overhead cables, wires and utilities will not be jeopardized.
 - 3. Do not leave fires unguarded.
 - 4. Do not burn poison oak, poison ivy or other plants of similar nature.
 - 5. Do not use tires or other combustible waste material to augment burning.
 - 6. Burn combustible materials daily as the work progresses.
 - 7. The Contractor shall be responsible for all damage caused by burning and shall be responsible for obtaining all necessary permits for burning.

3.3 REPLACEMENT OF MATERIALS

- A. Paving, Curbing and Miscellaneous Material:
 - 1. Remove all paving, subpaving, curbing, gutters, brick, paving block, granite curbing, flagging and minor structures that are over the area to be filled or excavated.
 - 2. Remove and replace bituminous asphaltic and portland cement concrete in accordance with the appropriate sections of these Specifications.
 - 3. Properly store and preserve all material to be replaced in a location approved by the Engineer.
- B. Shrubs and Bushes:
 - 1. Remove, store, and replace ornamental shrubs and bushes to be preserved in accordance with accepted horticultural practices.
- C. Topsoil:
 - 1. When applicable, carefully remove, store, and protect topsoil in accordance with the appropriate section of this division.
- D. Responsibility:
 - 1. Replace, at no additional cost to the Owner, materials lost or damaged because of careless removal or neglectful or wasteful storage, disposal or use of these materials.

END OF SECTION

SECTION 02115STRIPPING AND STOCKPILING TOPSOILPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Segregate topsoil approved by the Engineer prior to excavation, trenching and grading operations and stockpile it for use in the work.
- B. Related Work Specified Elsewhere (When Applicable):
 - 1. Demolition, clearing, grading, embankment, excavation and landscaping are specified in the appropriate sections in this division.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Topsoil shall consist of friable loam of at least two percent decayed organic matter (humus), free of subsoil, and reasonably free of clay lumps, brush, roots, weeds, and other objectionable vegetation, stones and similar objects larger than one (1) inch in any dimension, litter and other materials unsuitable or harmful to plant growth. It shall contain no toxic materials.
- B. The quality of the topsoil material to be used shall be subject to approval by the Engineer.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Remove topsoil from the areas that are likely to be disturbed as a result of construction operations to a depth based on the soil profile, as approved by the Engineer.
- B. Remove topsoil from all designated areas prior to the performance of normal excavation.

3.2 STORAGE

- A. Transport topsoil and deposit in storage piles convenient to the areas which are subsequently to receive the application of topsoil.
- B. Stockpile topsoil separate from other excavated materials in areas approved by the Engineer.
- C. Take all necessary precautions to prevent other excavated material and objectionable material from becoming intermixed with the topsoil before, during and after stripping and stockpiling operations.
- D. Neatly trim and grade stockpiles to provide drainage from surfaces and to prevent depressions where water may become impounded.

- E. Construct temporary erosion control devices for all stockpiled material, subject to the Engineer's approval.
- F. All loam stripped and stockpiled shall be immediately seeded with 70% Domestic/30% Perennial Rye Grass.

END OF SECTION

SECTION 02140TEMPORARY CONSTRUCTION DEWATERING SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Design, furnish, operate, maintain, and remove temporary dewatering system to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry; collect and dispose of ground and surface water where necessary to complete the work.
- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Section 02200 Earthwork

1.2 DESIGN REQUIREMENTS

- A. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least one foot below the bottom of pipe trench to allow material to be excavated in a dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where temporary excavation support systems are not required. Operate dewatering system continuously until backfill work has been completed.
- B. Control of surface and subsurface water is part of dewatering system requirements. Maintain adequate control so that:
 - 1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
 - 2. Erosion is controlled.
 - 3. Flooding of excavations or damage to structures does not occur.
 - 4. Surface water drains away from excavations.
 - 5. Excavations are protected from becoming wet from surface water, or ensure excavations are dry before additional work is undertaken
 - 6. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
 - 7. Maintain stability of sides and bottom of excavation. Construction operations are performed in the dry.
- C. Design shall include an assessment of how the dewatering operations will affect the stability of all adjacent structures
- D. Contractor is responsible to perform whatever geotechnical investigations are needed to design the dewatering system.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit qualifications of temporary dewatering system design engineer.

- C. Submit design calculations, description and complete scaled and dimensioned layout drawings of the proposed dewatering system. Such review shall not relieve the Contractor of sole responsibility for the dewatering system as necessary to prevent damage and settlement to adjacent structures, utilities, streets adjacent to excavations and for the safety of persons working within the excavated areas. Submittal shall identify:
 - 1. Location, depth and size of wellpoints, headers, sumps, ditches; size and location of discharge lines; capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
 - 2. Estimated average, minimum and maximum pumping rates (total)
 - 3. Method to minimize or eliminate pumping of fines.
 - 4. Standby pumping equipment
 - 5. Standby power equipment
 - 6. Treatment tankage and discharge locations
 - 7. Sample monitoring log (flow, TSS, etc.).
 - 8. System removal requirements.
 - 9. Written approval from the Owner for disposal of the treated water.
- D. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02156 (Temporary Excavation Support Systems).
- E. Submit monitoring results at the frequency required by the permitting authority.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:

- 1. Prior to any excavation below the ground water table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.
- 2. Keep work areas dewatered until the structures, pipes, and appurtenances to be built there have been completed to such an extent that they will not be damaged by water.
- 3. Thoroughly brace or otherwise protect against flotation all pipelines and structures which are not stable.
- 4. Maintain standby backup equipment and power supply throughout the duration of the dewatering operation.
- 5. Prevent soil particles from entering the discharge points.
- 6. Ground water level shall be maintained at least one foot below the bottom of the excavation.

- B. Disposal of Water:
1. Dispose of water pumped or drained from the construction site in a suitable manner to avoid siltation of adjacent drainage structures and piping, wetlands or water bodies, injury to public health, damage to public and private property, and damage to the work completed or in progress.
 2. Provide suitable temporary channels for water that may flow along or across the construction site.
 3. Provide treatment as necessary to prevent discharge of contaminated ground water caused by Contractor's operations, or any contaminated ground water that may pass through the excavation support system selected by the Contractor.
 4. Contractor must obtain all necessary regulatory approvals for the disposal of dewatering flows. These may include, among others, approval by the USEPA under the National Pollutant Discharge Elimination System (NPDES) program for construction activities.
- C. Damage:
1. Avoid damage to and settlement of adjacent buildings, roads, structures, utilities and other facilities.
 2. Any damage to or settlement of structures resulting from the dewatering operations, or the failure of the Contractor to maintain the work in a suitably dry condition shall be repaired by the Contractor at no additional cost to the Owner.
- D. Excavation Sump Pumping:
1. When necessary and where appropriate to the geotechnical conditions encountered, excavations may be over excavated 6 to 12 inches and filled with screened stone to allow sump pumping of groundwater.
 2. The system shall be installed with suitable screens and filters so that pumping of fines does not occur.

3.2 MONITORING

- A. General:
1. Contractor shall monitor the performance of the dewatering system and the groundwater level achieved throughout construction.
 2. Contractor shall monitor the effluent quality from the treatment system as required by the permitting authority.
- B. Corrective Action:
1. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system (loosening of the foundation strata, or instability of slopes, or damage to foundations or structures), the Contractor shall stop work and submit a revised temporary dewatering system design submittal. The revised plan shall indicate why the system revisions are needed and indicated what change will be made to address the issues. Contractor shall perform work necessary for reinstatement of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

END OF SECTION

SECTION 02156TEMPORARY EXCAVATION SUPPORT SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Design, furnish, install, maintain, and abandon-in-place or remove temporary excavation support system as required to comply with all applicable State and Federal regulations including the Occupational Safety and Health Act. Excavation support system shall consist of steel sheeting, pile and lagging bracing or other systems designed by the Contractor. Related Work Specified Elsewhere (When Applicable):
1. Section 02140 Temporary Construction Dewatering System
 2. Section 02200 Earthwork
 3. .

1.2 DESIGN REQUIREMENTS

- A. The Contractor shall be responsible for the design and construction of the excavation support structures. The excavation support structures (sheeting systems or other special excavation techniques) shall be properly designed by a Professional Engineer registered in the State in which the project is located, who practices in a discipline applicable to excavation work and has more than 5 years of experience in the design of excavation support systems. The excavation support system shall be designed to accommodate an additional 2 feet of excavation below the bottom of excavation shown on the Contract Drawings.
- B. The excavation support system shall be designed and installed to limit the upward hydraulic gradient into the bottom of the excavation and to sustain all existing and expected loads and utilities, to prevent migration of fine-grained materials into the excavation, to prevent all movement to earth which could in any way cause injury to workmen, delay the work or endanger adjacent structures. If detrimental effects result from construction activities, the Contractor shall modify the design, revise construction procedures and/or take measures to mitigate and abate further movement at no cost to the Owner.
- C. The Contractor shall prepare an excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as the adjacent grade and adjacent structures, throughout construction. The excavation support system monitoring plan shall include vibration and deformation monitoring. Contractor shall retain the services of a qualified vibration monitoring consultant to perform vibration monitoring during installation and removal of the excavation support system. Refer to Paragraphs 1.3 and 3.4 for additional requirements.
- D. The internal lateral bracing shall be located so that the braces shall not pass through walls and/or slabs of existing or proposed structures.
- E. The support system shall provide adequate room to properly perform the installation and to allow for inspection of the installation.

- F. Prior to the installation of any portion of the temporary lateral support system, the Contractor shall furnish to the Owner precondition surveys documenting the existing conditions of the adjacent structures.
- G. The use of existing structures to support the sheeting bracing or structural framing shall be prohibited.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit qualifications of temporary excavation support system design engineer.
- C. Submit attached certificate of design and complete scaled and dimensioned layout drawings of the proposed excavation system, stamped and sealed by a Professional Engineer registered in the State in which the project is located. Drawings shall show plan, sections and elevations of the support system as well as the proposed structures. Submittal shall identify:
 - 1. Physical location on the site and identify any existing utilities, site piping, site electrical conduit that must be relocated prior to excavation support system installation.
 - 2. Type and location of any surcharge loads adjacent to the excavation support system required by the Contractor to execute the work (e.g., excavators, trucks, cranes, soil piles, etc.).
 - 3. Design calculations, supporting documentation and materials cut sheets.
 - 4. Sample monitoring log.
 - 5. System abandonment or removal requirements.
- D. Submit excavation support system monitoring plan, including qualifications of Contractor's vibration monitoring consultant and Contractor's surveyor. The excavation support system monitoring plan shall identify: the specific method, location and frequency of measurements (pre-, during and post-construction); individual(s) responsible for inspection/measurements; submittal and maintenance of on-site records; and threshold vibration values and excavation support system deformation values that, if exceeded, will require immediate stoppage of work and the performance of repairs necessary for reinstatement of a functional system. Provide justification for recommended vibration and deformation tolerances, on a structure-by-structure basis.
- E. The Contractor shall have sole responsibility for design, construction, monitoring and abandonment or removal of the excavation support system as necessary to prevent damage to adjacent structures, utilities, streets adjacent to excavations and for safety of persons working within the excavated areas. The submittals will be reviewed for consistency with the design intent.
- F. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02401 (Temporary Dewatering System).

PART 2 - PRODUCTS

2.1 MATERIAL

- A. All materials shall conform to all applicable State and Federal regulations including the Occupational Safety and Health Act.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform preparatory work to discover, protect, maintain and restore utilities, foundations or other facilities located in close proximity of the proposed excavation lateral support system.
- B. Conduct pre-excavation to remove obstructions along the alignment of the excavation lateral support system which will interfere with installation of the excavation lateral support system.
- C. Install the excavation support system, including the installed wall and bracing system, outside the limits of the permanent structure. Construction tolerances (e.g., wall verticality) and lateral wall deflections as a result of excavation and other activities shall be considered in determining the plan location.
- D. Excavation shall not proceed more than 2 ft. below the bracing level, anywhere within the excavation support limits, until the entire level of bracing is completely installed.
- E. The first level of bracing shall be installed within 5 ft. of the ground surface prior to any excavation below this level.

3.2 INSTALLATION

- A. Install excavation support system in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act. The excavation support system design engineer shall visit the site during excavation support system installation.

3.3 INTERNAL LATERAL WALL BRACING (RAKERS, WALES AND STRUTS)

- A. Rakers are only allowed for the temporary lateral brace that is installed within 5 ft. of the ground surface.
- B. Use wales, struts, corner braces to provide support of the excavation lateral support walls as required. Include web stiffeners, plates, brackets, or angles as required to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Allow for eccentricities due to fabrication and assembly. Consider effects of temperature changes.
- C. Install and maintain all support members in continuous tight contact with each other and with the wall being supported.
- D. Preload all bracing members (including rakers, corner braces, and struts) in accordance with methods, procedures and sequence as described on the reviewed shop drawings. Coordinate excavation work with installation of bracing and preloading. Use steel shims and steel wedges, welded or bolted in place, to maintain the preloading force in the bracing after release of the jacking equipment pressure. Wood shims or wedges shall not be used. Braces shall be preloaded to 50 percent of the maximum design load. Provide means to control the fluctuation of loading due to temperature variations.
- E. Accomplish preloading by jacking struts, rakers, etc. in place against the excavation lateral support system walls, or by other methods acceptable to the Owner or Owner's Representative.

3.4 MONITORING

- A. Contractor shall implement the excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as adjacent grade and adjacent structures, throughout construction. Monitoring shall include the following at a minimum:
 - 1. Pre-Installation Structure Elevation Survey. Survey prior to excavation support system installation.
 - 2. Vibration Monitoring. Full-time vibration monitoring during excavation support system installation.
 - 3. Installation Structure and Support System Surveys.
 - a. After excavation support system installation but prior to first brace installation;
 - b. When at mid-point of excavation;
 - c. When at bottom of excavation;
 - d. At weekly intervals during structure construction.
 - e. Prior to excavation support system removal.
 - f. Each survey shall assess the support system deformation and key structures.
 - 4. Vibration monitoring. Full-time during excavation support system removal.
 - 5. Post-Installation Structure Survey. Survey after removal of excavation support system.
 - 6. No movement of or damage to structures shall be allowed.
- B. The excavation support system design engineer shall visit the site during the monitoring program at periodic intervals.
- C. Additionally, if the excavation support system monitoring criteria/requirements are not satisfied due to inadequacy or failure of the excavation support system (settlement of adjacent grade, settlement of structures, cracking of structures, etc.), immediately stop work and perform repairs necessary for reinstatement of a functional system, as well as restoration of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

3.5 ABANDONMENT-IN-PLACE OF SHEETING

- A. Sheeting shall be abandoned-in-place. Contractor shall cut the sheeting or such component at least 4 feet below the ground surface, or as directed by the Engineer.
- B. After cutting the sheeting to the proper depth, complete backfilling in accordance with the Specifications.

3.6 REMOVAL OF SHEETING

- A. Remove all sheeting and bracing unless the removal may cause injury to adjacent structures and/or property.
- B. The General Contractor shall be responsible for repairing all damage to existing structures caused by the removal of sheeting. The excavation support system design engineer shall visit the site during excavation support system removal.
- C. All backfill disturbed by the removal of the sheeting shall be re-compacted to its in-situ density.

- D. Proceed with backfilling as specified in these Specifications. When the level of compacted backfill reaches the location of bracing and wales, remove these items from the trench or other excavation. When the level of the backfill reaches a point three feet below the existing ground grade, remove the sheeting by approved methods and equipment.
- E. After removing the sheeting, complete backfilling in the usual manner.
- F. If the Contractor elects to leave the sheeting or any component of the temporary support system in place, the Contractor shall cut the sheeting or such component at least 4 feet below the ground surface, or as directed by the Engineer.

CERTIFICATE OF DESIGN

RE: Contract between
OWNER: _____
(Name)
and
CONTRACTOR: _____
(Name)
on
CONTRACT: _____
(Title)

(Number) (Date)

The undersigned hereby certify that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the state of _____(location of Project);
2. Is qualified by education and training to design the _____
specified in Section _____ of subject contract;
3. Has previously designed comparable excavation support systems;
4. Has prepared the design in full compliance with the requirements of subject contract, including all applicable laws, regulations, rules, and codes – including review and coordination with the Dewatering System design; and
5. Will inspect and supervise installation of the excavation support system, will monitor the in-place system to confirm that the system is installed and functions in accordance with the design and will inspect and supervise the removal of the excavation support system.

CONTRACTOR

ENGINEER

By: _____
(Signature)

(Name)

(Title)

(Date)

By: _____
(Signature)

(Name)

(Engineering Discipline)

(Date)

END OF SECTION

SECTION 02200EARTHWORKPART 1 - GENERAL1.1 DESCRIPTION

- A. The Work described by this Section consists of all earthwork encountered and necessary for construction of the project as indicated in the Contract Documents, and includes but is not limited to the following:
1. Excavation
 2. Backfilling and Filling
 3. Compaction
 4. Grading
 5. Providing soil material as necessary
 6. Disposal of unsuitable materials
 7. Disposal of excess suitable material
- B. Related Work Specified Elsewhere: (When Applicable)
1. Traffic Regulation is specified in Division 1.
 2. Clearing and Grubbing, Temporary Construction Dewatering System, Temporary Excavation Support System, Filter Fabric, Temporary Erosion Control, Stripping and Stockpiling of Topsoil, Sheeting, Landscaping, and Paving are specified in the appropriate sections of this Division.
 3. Section 01400 - Quality Control.
 4. Pipe, fittings and valves are specified in Division 2.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. All work shall be performed and completed in accordance with all local, state and federal regulations.
 2. The General Contractor shall secure all other necessary permits unless otherwise indicated from, and furnish proof of acceptance by, the municipal and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the Contract Documents.
- B. Line and Grade:
1. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same to properly perform the work.
- C. Testing Methods:
1. Gradation Analysis: Where a gradation is specified the testing shall be in accordance with ASTM C117 and ASTM C136 (or latest revision).
 2. Compaction Control:
 - a. Unless otherwise indicated, wherever a percentage of compaction for backfill is indicated or specified, it shall be the in-place density divided by the maximum density and multiplied by 100. The maximum density shall be the density at optimum moisture as determined by ASTM

Standard Methods of Test for Moisture-Density Relations of Soil Using 10-lb. Hammer and 18-in. Drop, Designation D1557 (Modified Proctor), or latest revision, unless otherwise indicated.

- b. The in-place density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand Cone method, Designation D1556, (or latest revision) or Nuclear method Designation D6938.
- c. Wherever specifically indicated, maximum density at optimum moisture may be determined by ASTM Standard Methods of Test for Moisture Density Relations of Soils, ASTM D6938 (Standard Proctor).
- d. An Independent Testing Laboratory will be retained by the Owner to conduct all laboratory and field soil sampling and testing, and to observe earth work and foundation construction activities. Laboratory testing will consist of sieve analyses, natural water content determinations, and compaction tests. Field testing will consist of in-place field density tests and determination of water contents.

1.3 SUBMITTALS

- A. Collection of samples and testing of all materials for submittals shall be performed by the Independent Testing Laboratory and paid for by the Contractor until the materials are approved by the Owner or Engineer.
- B. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- C. Submit test results (including gradation analysis) and source location for all borrow material to be used at least 10 working days prior to its use on the site. Contractor shall identify and provide access to borrow sites.
- D. Submit moisture density curve for each type of soil (on site or borrow material) to be used for embankment construction or fill beneath structures or pavement.

1.4 TESTS

- A. The Independent Testing Laboratory shall conform to the following procedures and standards:
 - 1. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
 - 2. All testing shall be performed by a qualified Independent Testing Laboratory acceptable to the Engineer and Contractor at the Owner's expense unless otherwise indicated (see Section 01400 - Quality Control).
- B. In addition to the above tests the Independent Testing Laboratory will perform additional density tests at locations and times requested by the Engineer.
 - 1. Additional density testing will be required by the Engineer if the Engineer is not satisfied with the apparent results of the Contractor's compaction operation.
 - 2. If the test results fail to meet the requirements of these specifications, the Contractor shall undertake whatever action is necessary, at no additional cost to the Owner, to obtain the required compaction. The cost of retesting will be paid by Contractor. No allowance will be considered for delays in the performance of the work.

1.5 JOB CONDITIONS

A. Site Information:

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner and Engineer will not be responsible for interpretations or conclusions drawn there from by the Contractor. Data are made available for the convenience of Contractor.
2. Additional test borings and other exploratory operations may be made by Contractor at no additional cost to Owner.

B. Existing Utilities and Structures:

1. The locations of utilities and structures shown on the Drawings are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warranties that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities or structures within the project area.

PART 2 - PRODUCTS

2.1 SOIL MATERIAL

- A. Aggregate Base: Shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. Type B Aggregate for base shall not contain particles of rock that will not pass the 4 inch square mesh sieve. The gradation of the part that passes a 3-inch sieve shall meet the following grading requirements:

<u>Sieve</u> <u>Designation</u>	<u>Percent by Weight</u> <u>Passing Square Mesh Sieves</u>
	<u>Type B</u> <u>Aggregate</u>
1/2 inch	35-75
1/4 inch	25-60
No. 40	0-25
No. 200	0-5

- B. Aggregate Leveling Course and Untreated Surface Course: Shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the material shall meet the grading requirements of the following table:

<u>Sieve Designation</u>	<u>Percentage by Weight Passing Square Mesh Sieves</u>
1 inch	95-100
3/4 inch	90-100
No. 4	40-65
No. 10	10-45
No. 200	0-7

- C. Common Borrow: Shall consist of approved material required for the construction of the work where designated. Common borrow shall be free from frozen material, perishable rubbish, peat, organic, and other unsuitable material.

<u>Sieve Designation</u>	<u>Percentage by Weight Passing Square Mesh Sieves</u>
6-inch	100
No. 200	0-5

Common borrow may be used for embankments unless otherwise indicated and provided that the material is at a moisture content suitable for compaction to the specified density. No rocks shall exceed 3/4 of the depth of the specified lift thickness.

- D. Crushed Stone: Shall be a uniform material consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, containing angular pieces, as are those which come from a mechanical crusher. Gradation requirements shall be as follows:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
1-1/2 inch	100
1 inch	95-100
1/2 inch	25-60
No. 4	0-10

- E. Screened Stone: Shall be a well graded stone consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, meeting the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

- F. Select Fill (Structural Fill): Shall consist of well graded granular material free of organic material, loam, wood, trash, snow, ice, frozen soil and other objectionable material and having no rocks with a maximum dimension of over 4 inches and meeting the following gradation requirements, except where it is used for pipe bedding in which case the maximum size shall be 2 inches.

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
4 inch	100
3 inch	90-100
1/4 inch	25-90
No. 40	0-30
No. 200	0-5

- G. Sand: Shall be well graded durable material free of organic matter and conform to the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
3/8 inch	100
No. 4	95-100
No. 16	50-85
No. 50	10-30
No.100	2-10
No.200	0-5

Sand conforming to the requirement for fine aggregate in ASTM Standard Specifications for Concrete Aggregate, Designation C-33, will meet the above requirement.

PART 3 -

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which excavating, backfilling, filling, compaction and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 EXCAVATION

A. General:

1. Excavation consists of removal and disposal of all material encountered when establishing line and grade elevations required for execution of the work.
2. The Contractor shall make excavations in such manner and to such widths as will give suitable room for building the structures or laying and jointing the piping; shall furnish and place all sheeting, bracing, and supports; shall do all cofferdamming, pumping, and draining; and shall render the bottom of the excavations firm, dry and acceptable in all respects.
3. All excavation shall be classified as either earth or ledge.
 - a. Earth Excavation shall consist of the removal, hauling and disposal of all earth materials encountered during excavation including but not limited to native soil or fill, pavement (bituminous or concrete), existing sewers and manholes, ashes, loam, clay, swamp muck, debris, soft or disintegrated rock or hard pan which can be removed with a backhoe, or a combination of such materials, and boulders that do not meet the definition of "Ledge" below.
 - b. Ledge Excavation: Shall consist of the removal, hauling, and disposal of all ledge or rock encountered during excavation. "Ledge" and "rock" shall be defined as any natural compound, natural mixture that in the opinion of the Engineer can be removed from its existing position and state only by drilling and blasting, wedging, sledging, boring or breaking up with power operated tools. No boulder, ledge, slab, or other single piece of excavated material less than two cubic yards in total volume shall be considered to be rock unless, in the opinion of the Engineer it must be removed from its existing position by one of the methods mentioned above.
4. The Contractor shall not have any right of property in any materials taken from any excavation. Do not remove any such materials from the construction site without the approval of the Engineer. This provision shall in no way relieve the Contractor of his obligations to remove and dispose of any material determined by the Engineer to be unsuitable for backfilling. The Contractor shall dispose of unsuitable and excess material in accordance with the applicable sections of the Contract Documents.

- B. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer and Resident Project Representative who will observe the conditions.
1. If material unsuitable for the structure or paved area or pipeline (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, screened stone, crushed stone, or concrete as directed by the Engineer.
 2. All excavated materials designated by the Engineer as unsuitable shall become the property of the Contractor and disposed of at locations in accordance with all State and local laws and the provisions of the Contract Documents.
- C. Unauthorized Excavation: Shall consist of removal of materials beyond indicated subgrade elevations or dimensions without specific authorization of Engineer. Unauthorized excavation, as well as remedial work required by the Engineer shall be at the Contractor's expense. Remedial work required is as follows:
1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with select fill or screened stone compacted to 95%. Provide 12" minimum select fill or screened stone directly under footings. Concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
 2. If the bottom of a trench is excavated beyond the limits indicated, backfill the resulting void with thoroughly compacted screened stone, unless otherwise indicated.
 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.
- D. Structural Excavation:
1. Shall consist of the removal, hauling, disposal, of all material encountered in the excavation to permit proper installation of structures.
 2. Excavations for structures shall be carried to the lines and subgrades shown on the Drawings.
 3. Excavate areas large enough to provide suitable room for building the structures.
 4. The extent of open excavation shall be controlled by prevailing conditions subject to any limits designated by the Engineer.
 5. Provide, install, and maintain sheeting and bracing as necessary to support the sides of the excavation and to prevent any movement of earth which could diminish the width of the excavation or otherwise injure the work, adjacent structures, or persons and property in accordance with all state and OSHA safety standards.
 6. Erect suitable fences around structure excavation and other dangerous locations created by the work, at no additional cost to the Owner.

7. Exposed subgrade surfaces shall remain undisturbed, protected, and maintained as uniform, plane areas and shape to receive the foundation components of the structure.
 - a. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10' and extending a sufficient distance from footings and foundations to permit installation of services, other construction, and for inspection.
- E. Trench Excavation: Shall consist of removal, hauling and disposal of all material encountered in the excavation to the widths and depths shown on the Drawings to permit proper installation of underground utilities.
 1. Excavate trenches to the uniform width shown on the Drawings sufficiently wide to provide sufficient space for installation, backfilling, and compaction. Every effort should be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
 2. Trenches shall be excavated with approximately vertical sides between the elevation of the center of the pipe and an elevation one foot above the top of the pipe.
 3. Grade bottoms of trenches as indicated for pipe and bedding to establish the indicated slopes and invert elevations, notching under pipe joints to provide solid bearing for the entire body of the pipe, where applicable.
 4. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least two feet above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall be excavated as though in undisturbed material.
 5. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer and storm lines and proceed up grade.
 6. Perform excavation for force mains and water mains in a logical sequence.
 7. The extent of open excavation shall be controlled by prevailing conditions subject to any limits prescribed by the Engineer.
 8. As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the state and OSHA safety standards, as outlined in the appropriate section of this Specification.
- F. Protection of Persons, Property and Utilities:
 1. Barricade open excavations occurring as part of this work and post with warning lights in compliance with local and State regulations.
 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures that may be required.
 3. Rules and regulations governing the respective utilities shall be observed in execution of all work. Active utilities and structures shall be adequately protected from damage and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped only with written authorization

of the utility owner. Report in writing to the Engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable.

4. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility, the property owner, and the Owner.
- G. Use of Explosives:
1. Do not bring explosives onto site or use in work.
 2. No blasting is permitted for this project.
- H. Stability of Excavations:
1. Slope sides of excavations to comply with all codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- I. Shoring and Bracing:
1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 2. Provide trench shoring and bracing to comply with local codes and authorities having jurisdiction. Refer to Specification Section 02156.
 3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Install shoring and bracing as excavation progresses.
- J. Material Storage:
1. Stockpile excavated materials which are satisfactory for use on the work until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and protect with temporary seeding or other acceptable methods to control erosion.
 2. Locate and retain soil materials away from edge of excavations.
 3. Dispose of excess soil material and waste materials as herein specified.
- K. Dewatering:
1. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations (including surface and subsurface waters).
 2. Excavations shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged. Refer to Specification Section 02140.
- L. Cold Weather Protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
 2. No frozen material shall be used as backfill or fill and no backfill shall be placed on frozen material.

- M. Separation of Surface Material:
1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the work.
 2. Prior to excavation, existing pavement shall be cut where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
 3. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.
 4. From areas within which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.
- N. Dust Control:
1. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. Refer to Specification Section 01562.
 2. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed.

3.3 BACKFILL AND FILL

A. General:

1. Backfilling shall consist of replacing material removed to permit installation of structures or utilities, as indicated in the Contract Documents.
2. Filling shall consist of placing material in areas to bring them up to grades indicated on the Drawings.
3. The Contractor shall provide and place all necessary backfill and fill material, in layers to the required grade elevations.
4. Backfill excavations as promptly as work permits, but not until completion of the following:
 - a. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - b. Inspection, approval, and recording locations of underground utilities.
 - c. Removal of concrete formwork.
 - d. Removal of shoring and bracing and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities or cut off and left in place if required.
 - e. Removal of trash and debris.
 - f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
 - g. Density testing having results meeting requirements specified herein.
5. In general, and unless otherwise indicated, material used for backfill of trenches and excavations around structures shall be suitable excavated material which was removed in the course of making the construction excavation. Unless

- otherwise specified or allowed by the Engineer the backfill and fill shall be placed in layers not to exceed 6 inches in thickness.
6. All fill and backfill under structures and pavement, and adjacent to structures, shall be compacted crushed stone or select fill as specified or as indicated on the Drawings. The fill and backfill materials shall be placed in layers not exceeding 6 inches in thickness.
 7. All structures (including manholes) shall be placed on a 6-inch mat of screened stone unless otherwise indicated.
 8. Suitable excavated material shall meet the following requirements:
 - a. Free from large clods, silt lumps or balls of clay.
 - b. Free from stones and rock fragments with larger than 3-inch max. dimension.
 - c. Free from organics, peat, etc.
 - d. Free from frozen material.
 9. If sufficient suitable excavated material is not available from the excavations, and where indicated on the Drawings, the backfill material shall be select fill or common borrow, unless otherwise indicated, as required and as directed by the Engineer.
 10. Do not backfill with, or on, frozen materials.
 11. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
 12. All areas to be filled or backfilled shall be free of construction debris, refuse, compressible or organic materials, and standing water.
 13. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet.
 14. Do not continue backfilling until the previously placed and new materials have dried sufficiently to permit proper compaction.
 15. The nature of the backfill materials will govern the methods best suited for their placement and compaction. Compaction methods and required percent compaction is covered in Compaction section.
 16. Before compaction, moisten or aerate each layer as necessary to provide a water content necessary to meet the required percentage of maximum dry density for each area classification specified.
 17. Do not allow large masses of backfill material to be dropped into the excavation in such a manner that may damage pipes and structures.
 18. Place material in a manner that will prevent stones and lumps from becoming nested.
 19. Completely fill all voids between stones with fine material.
 20. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
 21. Deposit backfill and fill material evenly on all sides of structures to avoid unequal soil pressures.
 22. Keep stones or rock fragments with a dimension greater than two inches at least one foot away from the pipe or structure during backfilling.
 23. Leave sheeting in place when damage is likely to result from its withdrawal.

24. Completely fill voids left by the removal of sheeting with screened stone which is compacted thoroughly.
- B. Pipe Bedding, Initial Backfill and Trench Backfill:
1. Place bedding and backfill in layers of uniform thickness specified herein, and as shown on the Drawings.
 2. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.
 3. Install pipe bedding and initial backfill in layers of uniform thickness not greater than eight (8) inches.
 4. Deposit the remainder of the backfill in uniform layers not greater than eight inches.
 5. Provide underground utility marking tape for new utility trenches as shown on the Drawings. Refer to Section 02650 – Buried Utility Markings.
 6. Where soft silt and clay soils are encountered the trench shall be excavated six inches below the normal bedding and backfilled with 6-inches of compacted sand.
 7. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
 8. The following schedule lists the bedding materials for various types of pipe. Refer to the pipe trench detail for dimensional requirements.

BEDDING REQUIREMENTS

DI or Concrete Pipe	screened stone or select fill.
PVC or PE Pipe	screened stone.

9. The following schedule lists the initial backfill requirements for various types of pipes. Refer to the pipe trench detail for dimensional requirements.

INITIAL BACKFILL REQUIREMENTS

DI or Concrete, Pipe	Screened stone or select fill
PVC or PE Pipe	Screened stone

10. Special bedding and backfill requirements shown on the Drawings supersede requirements of this section.

- C. Improper Backfill:
 - 1. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
 - 2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
 - 3. Excavation, backfilling, and compacting work performed to correct improper backfilling shall be performed at no additional cost to the Owner.
- D. Ground Surface Preparation:
 - 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surface steeper than 1 vertical to 4 horizontal.
 - 2. When existing ground surface has a density less than that specified under "compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

3.4 COMPACTION

- A. General:
 - 1. Control soil compaction during construction to provide not less than the minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements:
 - 1. Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D1557 as indicated.
 - a. Structures: Compact each layer of backfill or fill material below or adjacent to structures to at least 95% of maximum dry density (ASTM D1557).
 - b. Off Traveled Way Areas: Compact each layer of backfill or fill material to at least 90% of maximum dry density (ASTM D1557).
 - c. Walkways: Compact each layer of backfill or fill material to at least 93% of maximum dry density (ASTM D1557).
 - d. Roadways, Drives and Paved Areas: Compact each layer of fill, subbase material, and base material to at least 95% of maximum dry density (ASTM D1557).
 - e. Pipes: Compact bedding material and each layer of backfill to at least 90% maximum dry density (ASTM D1557). Where backfilling with excavated material, compact to native field density.
 - f. Embankments: Compact each layer of embankment material to at least 95% of maximum dry density (ASTM D1557).
- C. Moisture Control:
 - 1. Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, in quantities controlled to prevent free water appearing on surface during or subsequent to compaction operations.
 - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.
- D. Embankment Compaction:
1. After each embankment layer has been spread to the required maximum 8-inch thickness and its moisture content has been adjusted as necessary, it shall be rolled with a sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will ensure complete coverage and uniform compaction of an entire lift. Additional passes shall not be made until the previous pass has been completed.
 2. When any section of an embankment sinks or weaves excessively under the roller or under hauling units and other equipment, it will be evident that the required degree of compaction is not being obtained and that a reduction in the moisture content is required. If at any place or time such sinking and weaving produces surface cracks which, in the judgment of the Engineer are of such character, amount, or extent to indicate an unfavorable condition, he will recommend operations on that part of the embankment to be suspended until such time as it shall have become sufficiently stabilized. The ideal condition of the embankment is that attained when the entire embankment below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as the roller passes.
 3. If the moisture content is insufficient to obtain the required compaction, the rolling shall not proceed except with the written approval of the Engineer, and in that event, additional rolling shall be done to obtain the required compaction. If the moisture content is greater than the limit specified, the material of such water content may be removed and stockpiled for later use or the rolling shall be delayed until such time as the material has dried sufficiently so that the moisture content is within the specified limits. No adjustment in price will be made on account of any operation of the Contractor in removing and stockpiling, or in drying the materials or on account of delays occasioned thereby.
 4. If because of insufficient overlap, too much or too little water, or other cause attributable to defective work, the compaction obtained over any area is less than that required, the condition shall be remedied, and if additional rollings are ordered, they will be done at no cost to the Owner. If the material itself is unsatisfactory or if additional rolling or other means fails to produce satisfactory results, the area in question shall be removed down to material of satisfactory density and the removal, replacement, and re-rolling shall be done by the Contractor, without additional compensation.
 5. Material compaction by hand-operated equipment or power-driven tampers shall be spread in layers not more than 6 inches thick. The degree of compaction obtained by these tamping operations shall be equal in every respect to that secured by the rolling operation.

- E. Compaction Methods: The Contractor may select any method of compaction that is suitable to compact the material to the required density.
1. General: Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. All voids left by the removal of sheeting shall be completely backfilled with suitable materials and thoroughly compacted.
 2. Tamping or Rolling: If the material is to be compacted by tamping or rolling, the material shall be deposited and spread in uniform, parallel layers not exceeding the uncompacted thicknesses specified. Before the next layer is placed, each layer shall be tamped as required so as to obtain a thoroughly compacted mass. Care shall be taken that the material close to the excavation side slopes, as well as in all other portions of the fill area, is thoroughly compacted. When the excavation width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe or structure, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping or rolling, the rate at which backfilling material is deposited shall not exceed that permitted by the facilities for its spreading, leveling, and compacting as furnished by the Contractor.
- F. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.5 GRADING:

- A. General:
1. Grading shall consist of that work necessary to bring all areas to the final grades.
 2. Uniformly grade areas within limits of work requiring grading, including adjacent transition areas.
 3. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Grading Outside Building Lines:
1. Grade areas adjacent to building to drain away from structures and to prevent ponding.
 2. Grade surfaces to be free from irregular surface changes, and as follows:
 - a. Lawn or Unpaved Areas: Finish grade areas to receive topsoil to within not more than 1" above or below the required subgrade elevations.
 - b. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1/2" above or below the required subgrade elevation.
 - c. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 3/8" above or below the required subgrade elevation.

- C. Grading Surface of Fill Under Building Slabs:
 - 1. Grade surface to be smooth and even, free of voids, and compacted as specified, to the required elevation.
 - 2. Provide final grades within a tolerance of 1/2" when tested with a 10' straight edge.
- D. Compaction:
 - 1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.
- E. Protection of Graded Areas:
 - 1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

3.6 BASE COURSE AND LEVELING COURSE

- A. General:
 - 1. Base course consists of placing the specified materials in layers to support a leveling course or paved surface, as indicated in the Drawings.
- B. Grade Control:
 - 1. During construction, maintain lines and grades including crown and cross-slope of base course and leveling course.
- C. Placing:
 - 1. Place base course on prepared subbase conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting base materials.
 - 2. Place leveling course on prepared base course, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compaction.
- D. Shaping and Compacting:
 - 1. All layers of aggregate base course and leveling course shall be compacted to the required density immediately after placing. As soon as the compaction of any layer has been completed, the next layer shall be placed.
 - 2. The Contractor shall bear full responsibility for and make all necessary repairs to the base leveling courses and the subgrade until the full depth of the base leveling courses is placed and compacted. Repairs shall be made at no additional cost to the Owner.
 - 3. If the top of any layer of the aggregate base or leveling course becomes contaminated by degradation of the aggregate or addition of foreign materials, the contaminated material shall be removed and replaced with the specified material at the Contractor's expense.

END OF SECTION

SECTION 02225FLOWABLE FILLPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install flowable fill material in authorized excavation(s) as shown on the Drawings and/or as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Earthwork, excavation, backfilling, compaction, piping, manholes, testing and pavement are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 229, Controlled Low-Strength Materials, or as specified here-in.

1.3 SUBMITTALS

- A. Submit Mix designs for each mixture to be provided at least 15 days prior to production.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General: Materials shall meet the following requirements:
 - 1. Portland Cement, Type I or II - ASTM C150.
 - 2. Fly Ash (LOI limits do not apply) - ASTM C618.
 - 3. Fine Aggregate/Mineral Filler – ASTM C 33, ASTM or non-ASTM sands or mineral fillers with 100% passing the 1/2" sieve may be considered which produce an acceptable flow and desired performance characteristic. Soils with fine clays will not be considered. All other than ASTM C 33 materials must receive prior approval from the Engineer.
 - 4. Air Entraining Admixtures - As Per Manufacturer's Specifications.
 - 5. Light Weight Cellular Admixture - As Per Manufacturer's Specifications.
 - 6. Water – Potable or ASTM C 94.
 - 7. Preformed Foam – Procedures for evaluation ASTM C 796 and ASTM C 869.
- B. Standard Flowable Fill:
 - 1. Compressive strength at 28 days less than 1200 psi
- C. Excavatable Flowable Fill:
 - 1. MassDOT Type 2E, Flowable and Excavatable
 - 2. Compressive strength at 28 days between 100-200 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Flowable fill shall be produced and delivered using standard concrete construction equipment and practices.
- B. Placing flowable fill shall be by chute, pumping, or other method approved by the Engineer.
- C. The flowable fill shall be discharged directly from the mixer truck into the space to be filled.
- D. No flowable fill shall be placed on frozen ground.
- E. At the time of placement, the flowable fill shall have a temperature of at least 40 degrees F.
- F. When flowable fill is placed in freezing temperatures, the material should be covered with blankets and protected from freezing until hardening.
- G. The Contractor shall provide all necessary means to confine the material within a designated space.
- H. Formed walls or other bulkheads shall be constructed to withstand hydrostatic pressure exerted by flowable fill where necessary and as determined by the Engineer.
- I. The Contractor is responsible to ensure underground utilities, including but not limited to pipes, tanks, structures, cables, etc. are secured to prevent floating.
- J. No compaction or vibration of the material is required.
- K. Where flowable fill is being used as pipe bedding it shall be placed in lifts to ensure lateral support of the pipe develops along the side of the pipe before continuing with the backfilling.
- L. When paving over flowable fill in cold weather, any frozen material on the surface shall be scraped off and removed prior to paving.
- M. The flowable fill shall be left undisturbed until the material obtains sufficient strength. Sufficient strength for paving is achieved when the flowable fill can support the weight of foot traffic without apparent deformation. Sufficient strength for supporting vehicular traffic is 2.5 tons per square foot as measured by a pocket penetrometer.
- N. Trenches shall be covered and barricaded until hardening occurs.

END OF SECTION

SECTION 02270TEMPORARY EROSION CONTROLPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. The work under this section shall include provision of all labor, equipment, materials and maintenance of temporary erosion control devices as specified herein, and as directed by the Engineer.
2. Erosion control measures shall be provided as necessary to correct conditions that develop prior to the completion of permanent erosion control devices or as required to control erosion that occurs during normal construction operations.
3. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
4. After awarded the Contract, prior to commencement of construction activities, meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.

B. Related Work Specified Elsewhere:

1. Site work is specified in appropriate sections of this Division.

C. Design Criteria:

1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.

1.2 SUBMITTALS

- A. The Contractor shall furnish the Engineer, in writing, his work plan giving proposed locations for storage of topsoil and excavated material before beginning construction. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of the responsibility of completion of the work as specified.

1.3 QUALITY ASSURANCE

- A. All materials and methods of erosion control shall meet the guidelines established by the Massachusetts Department of Environmental Protection's "Stormwater Management Standards" (referred to hereafter as MassDEP SMS) and the "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas," May 2003 reprint or latest version.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Baled Hay:
 - 1. At least 14" by 18" by 30" securely tied to form a firm bale, staked as necessary to hold the bale in place.
- B. Sand Bags:
 - 1. Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.
- C. Mulches:
 - 1. Loose hay, straw, peat moss, wood chips, bark mulch, crushed stone, wood excelsior, or wood fiber cellulose.
 - 2. Type and use shall be as specified in MassDEP SMS.
- D. Mats and Nettings:
 - 1. Twisted Craft paper, yarn, jute, excelsior wood fiber mats, glass fiber and plastic film.
 - 2. Type and use shall be as specified in the MassDEP SMS.
- E. Permanent Seed:
 - 1. Conservation mix appropriate to the predominant soil conditions as specified in the MassDEP SMS and subject to approval by the Engineer.
- F. Temporary Seeding:
 - 1. Use species appropriate for soil conditions and season as specified in the MassDEP SMS and subject to approval by the Engineer.
- G. Water:
 - 1. The Contractor shall provide water and equipment to control dust, as directed by the Engineer.
- H. Silt Fence:
 - 1. Silt Fence shall be one of the commercially available brands, meeting the following requirements:

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Grab Tensile Strength (both directions)	ASTM D-4632	124 pounds
Puncture Strength	ASTM D-4833	60 pounds
Apparent Opening Size	ASTM D-4751	#30
Flow Rate	ASTM D-4491	8 gal/min/ft ²

2.2 CONSTRUCTION REQUIREMENTS

- A. Temporary Erosion Checks:
 1. Temporary erosion checks shall be constructed in ditches and other locations as necessary.
 2. Baled hay, sand bags or siltation fence may be used in an arrangement to fit local conditions.
- B. Temporary Berms:
 1. Temporary barriers shall be constructed along the toe of embankments when necessary to prevent erosion and sedimentation.
- C. Temporary Seeding:
 1. Areas to remain exposed for a time exceeding 3 weeks shall receive temporary seeding as indicated below:

<u>Season</u>	<u>Seed</u>	<u>Rate</u>
Summer (5/15 - 8/15)	Sudangrass	40 lbs/acre
Late Summer/Early Fall (8/15 - 9/15)	Oats	80 lbs/acre
Fall (9/15 - 10/1)	Annual Ryegrass	40 lbs/acre
Winter (10/1 - 4/1)	Winter Rye	112 lbs/acre
Spring (4/1 - 7/1)	Mulch w/Dormant Seed	80 lbs/acre*
	Oats	80 lbs/acre
	Annual Ryegrass	40 lbs/acre

* seed rate only

- D. Silt Fence shall be supported by posts and installed per the manufacturer's recommendations.
- E. Mulch All Areas Receiving Seeding:

Use either wood cellulose fiber mulch (750 lbs/acre); or straw mulch with chemical tack (as per manufacturers specifications). Wetting for small areas may be permitted. Biodegradable netting is recommended in areas to be exposed to drainage flow.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Temporary Erosion Checks:
 1. Temporary erosion checks shall be constructed in ditches and at other locations designated by the Engineer. The Engineer may modify the Contractor's arrangement of silt fences, bales and bags to fit local conditions.
 2. Baled hay, silt fences, or sandbags, or some combination, may be used in other areas as necessary to inhibit soil erosion.
 3. Siltation fence shall be located and installed as shown on plans or as required to comply with all Federal, State and Local Regulations.

- B. Maintenance:
1. Erosion control features shall be installed prior to excavation wherever appropriate. Temporary erosion control features shall remain in place and shall be maintained until a satisfactory growth of grass is established. The Contractor shall be responsible for maintaining erosion control features throughout the life of the construction contract. Maintenance will include periodic inspections by the Owner or Engineer for effectiveness of location, installation and condition with corrective action taken by the Contractor as appropriate.
- C. Removing and Disposing of Materials:
1. When no longer needed, material and devices for temporary erosion control shall be removed and disposed of as approved by the Engineer.
 2. When removed, such devices may be reused in other locations provided they are in good condition and suitable to perform the erosion control for which they are intended.
 3. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.

END OF SECTION

SECTION 02485LOAMING & SEEDINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, place, and test topsoil, seed, lime, and fertilizer where shown on the drawings and protect and maintain seeded areas disturbed by construction work, as directed by the Engineer.
- B. Related Work Specified Elsewhere (When Applicable): Earthwork, excavation, backfill, compaction, site grading and temporary erosion control are specified in the appropriate Sections of this Division.

1.2 SUBMITTALS AND TESTING

- A. Seed:
 - 1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is fully labeled in accordance with the Federal Seed Act and is at least equal to the specification requirements.
 - 2. This certification shall appear in, or with, all copies of invoices for the seed.
 - 3. The certification shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates and certificates have been approved.
 - 4. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer, in accordance with the latest rules and regulations under the Federal Seed Act.
- B. Topsoil:
 - 1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished.
 - 2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
 - 3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.
 - 4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing.
 - 5. Approval, by the Engineer, to use topsoil for the work will be dependent upon the results of the soils tests.
- C. Lime & Fertilizer:
 - 1. Furnish the Engineer with duplicate copies of invoices for all lime and fertilizer used on the project showing the total minimum carbonates and minimum percentages of the material furnished that pass the 90 and 20 mesh sieves and the grade furnished.

2. Each lot of lime and fertilizer shall be subject to sampling and testing at the discretion of the Engineer.
3. Sampling and testing shall be in accordance with the official methods of the Association of Official Agricultural Chemists.
4. Upon completion of the project, a final check may be made comparing the total quantities of fertilizer and lime used to the total area seeded. If the minimum rates of application have not been met, the Engineer may require the Contractor to distribute additional quantities of these materials to meet the minimum rates.

1.3 DELIVERY, STORAGE & HANDLING

A. Seed:

1. Furnish all seed in sealed standard containers, unless exception is granted in writing by the Engineer.
2. Containers shall be labeled in accordance with the United States Department of Agriculture's rules and regulations under the Federal Seed Act in effect at the time of purchase.

B. Fertilizer:

1. Furnish all fertilizer in unopened original containers.
2. Containers shall be labeled with the manufacturer's statement of analysis.

1.4 JOB CONDITIONS

A. Topsoil: Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental, in the opinion of the Engineer, to the proposed planting or to proper grading.

B. Seeding:

1. Planting Seasons: The recommended seeding time is from April 1 to September 15. The Contractor may seed at other times. Regardless of the time of seeding, the Contractor shall be responsible for each seeded area until it is accepted.
2. Weather Conditions:
 - a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
 - b. Stop the seeding work when, in the opinion of the Engineer, weather conditions are not favorable.
 - c. Resume the work only when, in the opinion of the Engineer, conditions become favorable, or when approved alternate or corrective measures and procedures are placed into effect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seed:

1. Provide the grass seed mixture approved by the Engineer, having the following composition:
 - a. Park Mixture:
 - 50 percent Creeping Red Fesque
 - 30 percent Kentucky Bluegrass
 - 20 percent Annual Ryegrass
 - b. Roadside Mixture:
 - 50 percent Creeping Red Fescue
 - 15 percent Kentucky Bluegrass
 - 5 percent White Clover
 - 2 percent Red Top
 - 3 percent Birdsfoot Trefoil
 - 25 percent Annual Ryegrass
2. Do not use seed which has become wet, moldy, or otherwise damaged in transit or during storage.

B. Topsoil:

1. Fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials and obtained from a well-drained site. Mixture of sand, silt, and clay particles in equal proportions.
2. Free of stumps, roots, heavy of stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, weeds, sticks, brush or other deleterious matter.
3. Not less than 4 percent nor more than 20 percent organic matter.
4. Topsoil depth shall be 4-inches, unless otherwise indicated.

C. Lime:

1. Provide lime which is ground limestone containing not less than 85% of total carbonate and of such fineness that 90% will pass a No. 20 sieve and 50% will pass a No. 100 sieve.
2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. 100 sieve. No additional payment will be made to the Contractor for the increased quantity.

D. Fertilizer:

1. Provide a commercial fertilizer approved by the Engineer.
2. Provide fertilizer containing the following minimum percentage of nutrients by weight:
 - 10% Available phosphoric acid
 - 10% Available potash
 - 10% Available nitrogen (75% of the nitrogen shall be organic)

PART 3 - EXECUTION

3.1 PREPARATION

A. Equipment:

1. Provide all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
2. Demonstrate to the Engineer that the equipment will apply materials at the specified rates.

B. Soil: Perform the following work prior to the application of lime, fertilizer or seed.

1. Scarify the subgrade to a depth of 2 inches to allow the bonding of the topsoil with the subsoil.
2. Apply topsoil to a depth of 4 inches or as directed on areas to be seeded.
3. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
4. Remove all objectionable material and form a finely pulverized seed bed.

3.2 PERFORMANCE

A. Grading:

1. Grade the areas to be seeded as shown on the Drawings or as directed by the Engineer.
2. Leave all surfaces in even and properly compacted condition.
3. Maintain grades on the areas to be seeded in true and even conditions, including any necessary repairs to previously graded areas.

B. Placing Topsoil:

1. Uniformly distribute and evenly spread topsoil on the designated areas.
2. Spread the topsoil in such a manner that planting work can be performed with little additional soil preparation or tillage.
3. Correct any irregularities in the surface resulting from topsoiling or other operations to prevent the formation of depressions where water may stand.
4. Thoroughly till the topsoil to a depth of at least 3 inches by plowing, harrowing, or other approved method until the condition of the soil is acceptable to the Engineer. The surface shall be cleared of all debris and or stones one inch or more in diameter.

C. Placing Fertilizer:

1. Distribute fertilizer uniformly at a rate determined by the soils test over the areas to be seeded.
2. Incorporate fertilizer into the soil to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.
3. The incorporation of fertilizer may be a part of the tillage operation specified above.
4. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will be acceptable.

D. Placing Lime:

1. Uniformly distribute lime immediately following or simultaneously with the incorporation of fertilizer.
2. Distribute lime at a rate determined from the pH test, to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.

- E. Seeding:
1. Fine rake and level out any undulations or irregularities in the surface resulting from tillage, fertilizing, liming or other operations before starting seeding operations.
 2. Hydroseeding:
 - a. Hydroseeding may be performed where approved and with equipment approved by the Engineer.
 - b. Sow the seed over designated areas at a minimum rate of 5 pounds per 1000 square feet.
 - c. Seed and fertilizing materials shall be kept thoroughly agitated in order to maintain a uniform suspension within the tank of the hydroseeder.
 - d. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates.
 3. Drill Seeding:
 - a. Drill seeding may be performed with approved equipment having drills not more than 2 inches apart.
 - b. Sow the seed uniformly over the designated areas to a depth of 1/2 inch and at a rate of 5 pounds per 1,000 square feet.
 4. Broadcast Seeding:
 - a. Broadcast seeding may be performed by equipment approved by the Engineer.
 - b. Sow the seed uniformly over the designated areas at a rate of 5 pounds per 1,000 square feet.
 - c. Sow half the seed with the equipment moving in one direction and the remainder of the seed with the equipment moving at right angles to the first sowing.
 - d. Cover the seed to an average depth of 1/2 inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other approved devices.
 - e. Do not perform broadcast seeding work during windy weather.
- F. Compacting:
1. Seeded areas must be raked lightly after sowing unless seeding is to be directly followed by application of an approved mulch.
 2. Compact the entire area immediately after the seeding operations have been completed.
 3. Compact by means of a cultipacker, roller, or other equipment approved by the Engineer weighing 60 to 90 pounds per linear foot of roller.
 4. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
 5. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion, or at right angles to the prevailing wind to prevent dust.

3.3 PROTECTION & MAINTENANCE

- A. Protection:
 - 1. Protect the seeded area against traffic or other use.
 - 2. Erect barricades and place warning signs as needed.
- B. Maintenance:
 - 1. At the time of the first cutting, set mower blades two inches high. All lawns shall receive at least two mowings before acceptance. Coordinate schedule for mowing with Engineer.
 - 2. Maintenance shall also include all temporary protection fences, barriers and signs and all other work incidental to proper maintenance.
 - 3. Maintain grass areas until a full stand of grass is indicated, which will be a minimum of 45 days after all seeding work is completed, and shall not necessarily related to Substantial Completion of the General Contract.
 - 4. Protection and maintenance of grass areas shall consist of watering, weeding, cutting, repair of any erosion and reseeded as necessary to establish a uniform stand for the specified grasses, and shall continue until Acceptance by the Engineer of the work of this section. It shall also include the furnishing and applying of such pesticides as are necessary to keep grass areas free of insects and disease. All pesticides shall be approved by Engineer prior to use.

3.4 ACCEPTANCE

- A. At final acceptance of the project all areas shall have a close stand of grass with no weeds present and no bare spots greater than three inches (3") in diameter over greater than five percent (5%) of the overall seeded area.

END OF SECTION

SECTION 02510CEMENT CONCRETE SIDEWALKSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: This work shall consist of the construction of new cement concrete sidewalks and driveways in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Engineer.
- B. Related Work Specified Elsewhere: (When Applicable) Earthwork, aggregate base and subbase, bituminous concrete paving and granite curbs are specified in the appropriate sections in this Division.

1.2 RELATED DOCUMENTS

- A. Massachusetts Department of Transportation Specifications.

1.3 QUALITY ASSURANCE

- A. Materials: Use only materials furnished by a bulk cement concrete producer regularly engaged in the production of Portland cement concrete.
- B. Submittals: A certificate of compliance shall be furnished to the Engineer that the materials supplied comply with the specification requirements.

1.4 SUBMITTALS

- A. Refer to 01340 for submittals.

PART 2 - PRODUCTS2.1 MATERIALS

- A. The portland cement concrete shall conform to the requirements of AASHTO M85 Type II with a moderate heat of hydration and with the following exceptions:
 - 1. The autoclave expansion shall be limited to a maximum of 0.20 percent.
 - 2. There will be no requirements for tensile strength.Only one brand of cement shall be used on any one contract unless otherwise permitted, in writing, be the Engineer.
- B. The welded wire fabric for reinforcement shall conform to the requirements of AASHTO M 55/M 55, unless otherwise specified.
- C. The premolded expansion joint material shall be non-extruding and resilient bituminous type and shall conform to the requirements of AASHTO M213.

PART 3 - EXECUTION3.1 EXCAVATION

- A. Excavation shall be to the depth and width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm even surface

conforming to the section shown on the plan. All soft and yielding material shall be removed and replaced with acceptable material.

3.2 FORMS

- A. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be true, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.3 PLACING CONCRETE

- A. The foundation shall be thoroughly moistened immediately prior to placing the concrete. The proportioning, mixing and placing of the concrete shall be in accordance with good construction practices, as stated in the Massachusetts DOT requirements.

3.4 FINISHING

- A. The surface shall be finished to produce a broom like pattern.
- B. No plastering of the surface with mortar will be permitted.

3.5 JOINTS

- A. Joints shall be located as shown on the plans. Slabs shall be placed alternately and the joints coated with an approved bituminous material before placing the adjacent slab.
- B. When a concrete sidewalk is constructed adjacent to a curb, building, retaining wall, light pole base or other fixed structure, a 1/4 inch thick premolded joint filler shall be used between the slab and the structure.

3.6 CURING

- A. Concrete shall be cured for at least 72 hours. Curing shall be by moist burlap or mats, white pigmented curing compound or by other approved methods. During the curing period, all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as may be directed.

END OF SECTION

SECTION 02525GRANITE CURBSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: This work shall consist of furnishing and installing curb or edging or removing and relaying existing curbing or edging in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Engineer. The types of curbs are designated as follows:
Type 1 - Vertical granite curb
Type 5 - Sloped granite edging
- B. Related Work Specified Elsewhere: Excavation and Embankment, Aggregate Base and Subbase, Bituminous Concrete Paving and Landscaping are specified in the appropriate Sections of this Division.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable sections of Division 1, and the General Conditions of the Specifications.
- B. Provide dimensional information, layout diagrams, and source of materials.
- C. Submit mortar mix design.
- D. Submit masonry contractor's qualifications.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General:
1. The stone for curbing and edging shall be hard, durable, quarried granite.
 2. It shall be gray in color, free from seams, cracks or other structural defects and shall be of smooth splitting character.
 3. The curb may contain natural color variations that are characteristic of the granite source.
 4. The dimensions, shape and other details shall be as shown on the Drawings.
- B. Source:
1. The Contractor shall submit for approval the name of the quarry which is the proposed source of the granite for curb materials.
 2. Samples shall be submitted for acceptance by the Engineer when requested.
- C. Finish and Surface Dimensions:
1. Vertical Curb, Type 1:
 - a. The individual curb stones shall conform to the dimensions indicated on the Drawings.
 - b. Individual stones shall be furnished in minimum lengths of 6 feet, unless otherwise specified.

- c. The exposed face of the stone curb shall be free from indications of drill holes. Half drill holes not larger than 3/4 inches diameter will be permitted in the arris line in the plane of the back.
 - d. The top surface shall be sawed or dressed to an approximately true plane with no depression or projection on that surface of over 1/8 inch.
 - e. The top front arris line shall be pitched straight and true with no variations from a straight line greater than 1/4 inch.
 - f. The top back arris line shall meet the same requirement as the top front arris except that indentations of a maximum of 3/8 inch will be allowed.
 - g. There shall be no projection or depression on the back face which would exceed a batter of 1 horizontal on 3 vertical for a distance from the top of 3 inches.
 - h. The front face shall be at right angles to the top and shall be smooth split and have no projections greater than one inch or depressions greater than 1/2 inches, measured from the vertical plane of the face through the top arris line, for a distance down from the top of 8 inches. The remainder of the face shall have no projections or depressions greater than one inch measured in the same manner.
 - i. The ends of the curb shall be approximately square with the planes of the top, back and face and so finished that when the sections are placed end to end with the required minimum spacing of 1/4 inch no more than 5/8 inch space shall show in the joint for the full width of the top surface and for the entire exposed front face. The remainder of the end may extend back no more than 8 inches from the plane of the joint.
 - j. The bottom surface may be sawn or split.
 - k. Drill holes through the curb will be allowed providing they are at least 9 inches below the top and are mortared full with portland cement mortar before placing the stone.
2. When curbing is specified on the Drawings with a radius of 60 feet or less, it shall be cut on the specified radius.
3. Curb Inlets: Inlets used at catch basins shall conform to the applicable requirements of Vertical Curb, Type 1, and to the shape, dimensions and details as shown on the Drawings.
4. Sloped Edging, Type 5:
- a. The individual edging stones shall conform to the dimensions indicated on the Drawings.
 - b. Individual stones shall be furnished in minimum lengths of two (2) feet, unless otherwise specified.
 - c. The exposed face shall be smooth split to an approximate true plane having no projections or depressions which will allow over one (1) inch to show between a two (2) foot straightedge and the face when the straightedge is placed as closely as possible on any part of the face.
 - d. Half drill holes not more than three (3) inches in length and 3/4 inch in diameter will be permitted along the bottom.
 - e. The arris line, top front shall be straight and true with no variation from a straight line greater than 1/8 inch.

- f. The arris lines at the bottom of the face shall be straight and true so that not over one (1) inch shall show between the stone and a straightedge for the full length of the stone.
 - g. The ends shall be square to the length at the face and so finished that when the stones are placed end to end, no space more than 1 1/2 inches will show in the joint for the width of the face.
 - h. When sloped edging is specified on the Drawings with a radius of thirty (30) feet or less, it shall be cut on the specified radius.
5. Terminal curb, Type 1: Shall meet the requirements of Vertical Curb, Type 1 as contained herein.
- D. Joint Mortar:
- 1. Shall consist of one (1) part portland cement and two (2) parts sand and mixed with sufficient water to form a plastic composition.
 - 2. The portland cement shall conform to AASHTO M85, Type II-A.
 - 3. The sand shall consist of the following gradation:
 - 100% Passing the No. 8 sieve
 - 15-40% Passing the No. 50 sieve
 - 0-10% Passing the No. 100 sieve
 - 0-5% Passing the No. 200 sieve

PART 3 - EXECUTION

3.1 REMOVAL OF CURBING

- A. The Contractor shall carefully remove, store and clean curb specified on the Drawings or designated for resetting.
- B. Curbing damaged or destroyed, as a result of the Contractor's operations or because of his failure to store and protect it in a manner that would prevent loss or damage, shall be replaced with curbing of equal quality at the Contractor's expense.

3.2 EXCAVATION

- A. Excavation shall be made to the required depth and base material upon which the curb is to be set shall be compacted to a firm, even surface.
- B. All soft and unsuitable material shall be removed and replaced with suitable material which shall be thoroughly compacted.

3.3 INSTALLATION

- A. The curb and sloped edging shall be set so that the front top arris line is in close conformity to the line and grade required.
- B. All space beneath the curbing shall be filled and thoroughly tamped with material meeting the requirements of the bed course material.

3.4 JOINTS

- A. The required spacing between stones shall be a minimum of 1/4 inch and a maximum of 5/8 inch for Type 1 curb.
- B. The required spacing between stones shall be a maximum of 1/2 inch for Type 5 curb.
- C. Joints between stones shall be carefully filled with mortar along the back portion of the joint to prevent loss of backfill material.

3.5 BACKFILLING

- A. After the joints have set, any remaining excavated areas shall be filled and tamped with approved material placed in eight (8) inch layers.

3.6 CURB INLETS

- A. Curb placed adjacent to curb inlets shall be installed with steel dowels cemented into each stone with epoxy grout.

END OF SECTION

SECTION 02601MANHOLES, COVERS AND FRAMESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere (when applicable):
 - 1. Final sewer testing is specified in this Division.
 - 2. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.
 - 3. Grout is specified in Division 3.

1.2 QUALITY ASSURANCE

- A. Precast Manhole Base, Barrel and Top Sections:
 - 1. Conform to ASTM C478 except as modified herein, and on the Drawings.
 - 2. Average strength of 4,000 psi at 28 days.
 - 3. Testing:
 - a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
 - b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
 - c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.
- B. Frames and Covers:
 - 1. Acceptable Manufacturers:
 - a. EJ Castings
 - b. Neenah Foundry Company.
 - c. Or equal
- C. Exterior Chimney Wrap/Seal
 - 1. Acceptable Manufacturers:
 - a. Sealing Systems, Inc. Infi-Shield Uni-Band
 - b. Or equal
- D. Masonry:
 - 1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
 - 2. Cement: ASTM C150.
 - 3. Hydrated Lime: ASTM C207
 - 4. Sand: ASTM C33
- E. Waterproofing:
 - 1. Acceptable Manufacturers:
 - a. Karnak #220 AF Fibered Emulsion Dampproofing, Karnak Corp., Clark, NJ.
 - b. PPS 922 Superseal, International Precast Supply.

- c. Or equal.
- F. Pipe connections shall conform to ASTM C 923, "Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

1.3 SUBMITTALS

- A. Submit shop drawings and manufacturer's literature in conformance with Section 01340 and the Standard General Conditions of the Construction Contract.
- B. Precast Manhole Sections: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

- A. Dimensions, shall be as shown on the Drawings:
 - 1. Base & Riser Sections:
 - a. Diameter: As shown on the Drawings.
 - b. Length: As required.
 - c. Wall Thickness: Not less than 5 inches.
 - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to ensure accurate joint surfaces.
 - 2. Tops:
 - a. Diameter: Eccentric cone type, 36 inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
 - b. Height: 4 feet.
 - c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
 - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to ensure accurate joint surfaces.
 - e. Exterior face of cone sections shall not flare out beyond the vertical.
 - 3. Flat Slab Tops:
 - a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
 - b. Slab thickness: Not less than 6 inches.
 - c. Constructed to support an HS-20 wheel loading.
- B. Openings:
 - 1. Provide openings in the risers to receive pipes entering the manhole.
 - 2. Make openings at the manufacturing plant.
 - 3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
 - 4. Location: To permit setting of the entering pipes at the correct elevations.
 - 5. Openings shall have a flexible watertight union between pipe and the manhole base.
 - a. Cast into the manhole base and sized to the type of pipe being used.
 - b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
 - i. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
 - ii. Kor N Seal made by National Pollution Control System, Inc.

- iii. Press Wedge II made by Press-Seal Gasket Corporation.
- iv. A-Lok Manhole Pipe Seal made by A-Loc Corporation.
- v. Or equivalent.

C. Joints:

1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. Install a double row of joint sealants for every manhole joint. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.

Acceptable Materials:

- a. Kent-Seal No. 2
 - b. Ram-Nek
 - c. Or equivalent.
2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
 3. All manholes greater than 6 ft. diameter and all manholes used as wet wells, valve pits and other dry-pit type structures shall be installed with exterior joint collars. The joint collar shall be installed according to the manufacturer's instructions. Acceptable materials: MacWrap exterior joint sealer as manufactured by Mar-Mac Manufacturing Company; or equivalent.

D. Waterproofing:

1. The exterior surface of all manholes shall be given two coats of waterproofing material at a application rate as recommended by the manufacturer.
2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

2.2 FRAMES AND COVERS

A. Standard Units:

1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
2. Have machined bearing surfaces to prevent rocking.
3. Castings shall be smooth with no sharp edges.
4. Constructed to support an HS-20 wheel loading.
5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
 - a. Covers -solid with sewer in 3-inch letters diamond pattern.
 - b. Frame - 36-inch diameter clear opening, with flange bracing ribs.
6. Minimum weight of frame and cover shall be 370 lbs.

2.3 MASONRY

A. Brick:

1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
2. Immediately remove rejected brick from the work.

B. Mortar:

1. Composition (by volume):

- a. 1 part Portland cement.
 - b. 1/2 part hydrated lime.
 - c. 4-1/2 parts sand.
2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement shall be Type II Portland cement.
- D. Hydrated lime shall be Type S.
- E. Sand:
1. Shall consist of inert natural sand.
 2. Grading:

<u>Sieve</u>	<u>Percent Passing</u>
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Precast Manhole Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
 2. Install riser sections and tops level and plumb.
 3. Make all joints watertight.
 4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.
 5. When manhole steps are included in the Work, install barrel sections and tops so that steps are in alignment.
- B. Adjust to Grade:
1. Adjust tops of manholes to grade with brick masonry.
 2. Concrete rings are not acceptable for adjusting to grade.
 3. In paved areas, set frame and cover to final grade after binder pavement is placed and the grade of surface pavement has been determined.
- C. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer. Special care shall be taken to ensure that the openings through which pipes enter the structure are watertight.
- D. Masonry:
1. Laying Brick:
 - a. Use only clean bricks in brickwork for manholes.

- b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
 - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
 - d. Construct all joints in a neat, careful manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
 - e. Outside faces of brick masonry shall be plastered with mortar from 1/4-inch to 3/8-inch thick.
 - f. Completed brickwork shall be watertight.
2. Curing:
- a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
 - b. Protect brick masonry from the weather and frost as required.
- E. Frames and Covers:
- 1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
 - 2. Completely fill all voids beneath the bottom flange to make a watertight fit.
 - 3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
 - 4. Clean the frame seats before setting the covers in place.
- F. Plugging and Patching:
- 1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
 - 2. Touch up damaged water proofing.
- G. Cleaning:
- 1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.
- H. Bedding and Backfilling:
- 1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
 - 2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

3.2 MANHOLE TESTING

- A. General:
- 1. Perform a vacuum test on all manholes
 - 2. Perform all testing in the presence of the Engineer.
 - 3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.
- B. Vacuum Test:
- 1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling. Vacuum testing to be conducted prior to construction of invert channels.
 - 2. Plug all lifting holes completely with non-shrink grout.
 - 3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
 - 4. Install the testing equipment according to the manufacturer's instructions.

5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is:
 - a. Greater than 2 minutes for manholes less than 10-feet deep.
 - b. Greater than 2.5 minutes for manholes 10 to 15-feet deep.
 - c. Greater than 3 minutes for manholes more than 15-feet deep.
 6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.
- C. Manhole Repairs:
1. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
 2. The use of lead-wool or expanding mortar will not be permitted.
- D. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

END OF SECTION

SECTION 02615DUCTILE IRON PIPE & FITTINGS
(BURIED APPLICATIONS)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install ductile iron pipe and fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Pipe and Pipe Fittings - General is specified in 15050. Excavation, Bedding and Backfill are specified in this Division.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all pipe and fittings.

1.3 QUALITY ASSURANCE

- A. Standards (As Applicable):
 - 1. Cement-mortar lining for water: ANSI A21.4 (AWWA C104).
 - 2. Rubber gasket joints: ANSI A21.11 (AWWA C111).
 - 3. Ductile iron pipe thickness: ANSI A21.50 (AWWA C150).
 - 4. Ductile iron pipe centrifugally cast in metal or sand lined molds: ANSI A21.51 (AWWA C151).
 - 5. Pipe flanges and fittings: ANSI B16.1 and ANSI A21.10 (AWWA C110).
 - 6. Threaded, flanged pipe: ANSI A21.15 (AWWA C115).
 - 7. Cast and ductile iron fittings: ANSI A21.10 (AWWA C110).
 - 8. Ductile Iron Compact Fittings: ANSI 21.53 (AWWA C153).
 - 9. External zinc-based coating: ISO 8179-1.
- B. Acceptable Manufacturers:
 - 1. Tyler Union
 - 2. Griffin
 - 3. US Pipe
 - 4. American
 - 5. McWane
 - 6. Or equal.

1.4 DELIVERY, STORAGE & HANDLING

- A. Exercise extra care when handling ductile iron pipe because it is comparatively brittle.
- B. Exercise extra care when handling cement lined pipe because damage to the lining

will render it unfit for use.

- C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by wood lagging securely fastened in place.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. General:

1. All exterior (buried) ductile iron pipe shall have push-on or mechanical joints unless otherwise specified or shown on the Drawings. Pipe within valve pits and other structures is considered interior pipe and shall be flanged.
2. Unless otherwise shown on the Drawings or in the pipe schedule, the minimum thickness of ductile iron pipe shall be:
 - a. For pipe 4 inches in diameter and smaller: Class 51.
 - b. For pipe 6 inches in diameter and larger: Class 53.
 - c. Pipe with flanges: Class 53.
3. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
4. Pipe shall be double thickness cement lined and seal coated unless noted otherwise on the Drawings, and except for air piping lines which shall be completely unlined.
5. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.

B. Coatings

1. Finish layer of factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless specified otherwise.
2. Coatings shall be furnished on the exterior of all underground piping as follows unless specified otherwise.
 - a. Initial layer of arc-applied, zinc metallic coating (in accordance with ISO 8179-1), having a mass of 200 g/m². Pipe shall include the word 'zinc' in the pipe markings or label required by AWWA C151.
 - b. Finish layer of factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless specified otherwise.
3. The outside of pipe within structures and exposed shall not be coated with bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 by Koppers Co.; Multiprime by PPG Industries; Chromox 13R50 Primer made by Mobil Chemical Co.; or equivalent.

C. Joints (as shown on Drawings or as specified):

1. Push-on and Mechanical Joint:
 - a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.

- b. Provide gaskets manufactured from a composition material suitable for exposure to the fluid to be contained within the pipe. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 250°F.
 - c. Bolts and nuts for buried mechanical joints shall meet the AWWA C-111 requirements and be made of high strength, low alloy steel.
2. Flanged:
- a. Provide specially drilled flanges when required for connection to existing piping or special equipment.
 - b. Flanges shall be long-hub screwed tightly on pipe by machine at the foundry prior to facing and drilling.
 - c. Gaskets:
 - i. Ring type of rubber with cloth insertion.
 - ii. Thickness of gaskets 12 inches in diameter and smaller: 1/16 inch.
 - iii. Thickness of gaskets larger than 12 inches in diameter: 3/32 inch.
 - iv. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 200°F.
 - d. Fasteners:
 - i. Make joints with bolt, studs with a nut on each end, or one tapped flanged with a stud and nut.
 - ii. The number and size of bolts shall meet the requirements of the applicable ANSI standard.
 - iii. Nuts, bolts, and studs shall be Grade B meeting the requirements of ASTM A307.
 - iv. After jointing, coat entire joint with bituminous material compatible with pipe coating unless other coating required by Section 09900.
 - e. When applicable, provide and install flange clamps as shown on the Drawings.
3. Joint Bracing:
- a. Provide joint bracing to prevent the piping from pulling apart under pressure as required and as shown on the Drawings.
 - b. Types of bracing:
 - i. Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with bituminous paint in buried installations and shall be coated with the same coatings as the piping system in interior installations after assembly or, if necessary, prior to assembly.
 - ii. Mechanical joint follower gland pipe restrainers.
 - (1) Ductile iron gland and restraining ring.
 - (2) Gasket shall be standard MJ gasket -ANSI/AWWA-C111/A21.11.
 - (3) Working pressure 350 psi, up to 8 inches; 250 psi, 10 inches

- to 16 inches.
- (4) Test pressure two times working pressure.
- (5) Grip Rings™, Romac Industries, or other equivalent as approved by Engineer.
- iii. Other types of bracing as shown on the Drawings.

2.2 FITTINGS

- A. Standard Fittings:
 - 1. Pressure rating of 350 psi for D.I. compact fittings and 250 psi for all others unless indicated otherwise on the Drawings or as specified.
 - 2. Joints the same as the pipe with which they are used or as shown on the Drawings.
 - 3. Cement lining and seal coat as specified for pipe.
 - 4. Factory applied bituminous coatings shall be furnished for all underground fittings.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
 - 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
 - 2. Deviations beyond allowable tolerances for pipe clearances.
- D. Immediately remove all rejected materials from the project site.

3.2 INSTALLATION

- A. General:
 - 1. Install in strict accordance with the pipe and fitting manufacturer's instructions and recommendations and as specified or as shown on the Drawings.
 - 2. Concrete thrust blocks or other acceptable thrust resistant systems are required to be provided and installed at all valves and fittings on pressure pipe. Where thrust blocks are used, these shall be placed against undisturbed soil or screened gravel compacted to 95 percent and shall be placed so that the joints are accessible for repairs.
 - 3. Provide and install thrust restraint at each pipe joint, as necessary to meet the thrust restraint requirements per Drawings and manufacturer recommendations, whichever provide the larger thrust requirements.
- B. Assembling Joints:
 - 1. Push-on Joints:
 - a. Insert the gasket into the groove of the bell.
 - b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.

- c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.
 - 2. Bolted Joints:
 - a. Remove rust preventive coatings from machined surfaces prior to assembly.
 - b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
 - c. After jointing coat all bolts with bituminous material compatible with the pipe coating required herein and/or in Section 09900.
 - 3. Flanged Joints:
 - a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
 - b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.
 - 4. Mechanical Joints:
 - a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
 - b. Lubricate the gasket, bell, and spigot by washing with soapy water.
 - c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
 - d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.
 - e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
 - f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
 - i. Range or Torque: 60-90 ft.-lbs.
 - ii. Length of Wrench: 10 inches.
 - g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.
 - 5. Bell and Spigot Joints:
 - a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
 - b. Insert the spigot firmly into place and hold securely until the joint has been properly completed.
- C. Fabrication:
 - 1. Tapped Connections:
 - a. Make all tapped connections as shown on the Drawings or as required by the Engineer.
 - b. Make all connections watertight and of adequate strength to prevent pullout.
 - c. Drill and tap normal to the longitudinal axis of the pipe.

- d. Taps in fittings shall be located where indicated by the manufacturer for that particular type of fitting.
 - e. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANS A21.51 based on 2 full threads for ductile iron and 3 full threads for cast iron.
2. Cutting:
- a. Perform all cutting as set forth in AWWA C600.
 - b. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.
- D. Pipe Deflection:
- 1. Push-on and Mechanical Joints:
 - a. The maximum permissible deflection of alignment at joints shall be limited to that given in AWWA C600.
 - 2. Flexible Joints:
 - a. The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 02635COMBINATION AIR VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test combination air release valves of the size and the type and in the locations shown on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

- A. All air release valves, for the same service, shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
 - 1. A.R.I. Flow Control Accessories USA
 - 2. Or equivalent.

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that valves meet or exceed the requirements of these Specifications.
- C. Submit manufacturer's installation instructions, maintenance manual, and specifications for all valves.
- D. Submit manufacturer's orifice sizing method and analysis based on AWWA M51 standard for combination air valve selection.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General:
 - 1. All valves shall be suitable for the intended services.
 - 2. Valve sizing shall be as recommended by the manufacturer to suit the pressure and flow condition of each application.
- B. Sewage and Sludge Service:
 - 1. Combination Air Valves:
 - a. Shall allow unrestricted venting or re-entry of air, through it, during filling or draining of the force main, to prevent water column separation or pipeline collapse due to vacuum.
 - b. Reinforced nylon body (conical shape, funnel shape lower body), stainless steel covers, polypropylene float, stainless steel internal parts, and Buna-N needle.
 - c. Conical body shape and external guide rod shall be designed to maintain maximum distance between the liquid and the sealing mechanism.
 - d. All internals shall be easily removed through the top covers without removing the main valve from the lines.

- e. Working pressure range 3–250 psi.
- f. Furnished with inlet shutoff valve; outlet; blowoff/drain valve; shutoff valve with quick disconnect coupling and 5-feet of hose to permit backflushing without dismantling valve.
- g. Equal to A.R.I. D-26 PN16-T2 combination air valve for wastewater.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves in accordance with manufacturer's instructions and recommendations and as shown on the Drawings.
- B. Install all valves in the vertical position and allow sufficient clearance around valve for proper maintenance and removal.
- C. Provide gate valve between air release valve and pipeline.
- D. Inlet piping to the air valves shall be brass.
- E. The exhaust lines from the air valves shall terminate in down turned position 18 inches above the floor.

END OF SECTION

SECTION 02641GATE VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified.
- B. Related Work Specified Elsewhere:
 - 1. "Valve Box" and "Ductile Iron Pipe & Fittings for Buried Applications" are specified in this Division.

1.2 QUALITY ASSURANCE

- A. All gate valves of same type and style shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
 - 1. American Flow Control
 - 2. Kennedy/McWane
 - 3. Clow/McWane
 - 4. Mueller
 - 5. Or approved equal.

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that valves meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all valves.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Waterworks type NRS valves (AWWA):
 - 1. Valve Body, bonnet and stuffing box - Cast iron (ASTM A126 C1B), or Ductile iron (ASTM A536), coated inside and out with fusion bonded epoxy meeting AWWA C550. Face-to-face dimensions shall comply with ANSI B16.10 and flanges to comply with ANSI B16.1.
 - 2. Resilient Wedge - Ductile iron wedge with bonded EPDM or Nitrile (Buna-N/NBR) rubber covering.
 - 3. Stem - Manganese bronze, ASTM B584
 - 4. Stuffing box O-rings
 - a. Two O-rings, each nitrile rubber.
 - b. Capable of changing under pressure.
 - 5. Wedgenut - Bronze, ASTM B62 or Manganese bronze, ASTM B584
 - 6. Bolting - stainless steel Type 18-8 (304 SS), ASTM F593, GP1
 - 7. End Connections

- a. Buried valves – gasketed and bolted mechanical joints in conformance with AWWA standards for appropriate pipe material.
 - b. Exposed valves in buried structures – flanged and bolted joints in conformance with ANSI/ASME B16.1 and AWWA standards for appropriate pipe material. Bolts shall be stainless steel.
8. Operation
- a. Buried valves – 2-inch square nut, cast iron, ASTM A126, C1B or ductile iron, ASTM A536. Provide a sufficient of tee-handle valve wrenches for operation valves of various depths.
 - b. Opening Direction – counterclockwise (open left)
9. Water working pressure: 250 psi
10. Standards - valves shall meet or exceed AWWA C509, latest edition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves with stem position vertical.
- B. Valve box vertical and centered over operating nut.
- C. Valve box supported during backfilling and maintained vertical.
- D. Install and test in accordance with AWWA C500 and AWWA C-509, latest revision.

END OF SECTION

SECTION 02694PREFABRICATED PIPE HANGERS, SUPPORTS AND BRACINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Design, furnish and install prefabricated pipe hangers, supports, and braces to support pipes, maintain the necessary pitch, minimize vibration, prevent movement, and allow expansion and contraction of the pipes shown on the Drawings, as specified herein and as referenced. Supports shall be designed for all tributary gravity loads and lateral loads from operating pressures, seismic forces, and startup/shutdown water hammer thrust. This Specification covers hangers, supports, and braces for process and mechanical piping systems including ductile iron and HDPE.

1.2 RELATED SECTIONS

- A. Pipe, pipe fittings and valves are specified in respective sections of Division 2.

1.3 REFERENCES

- A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids.
- B. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
1. MSS SP-58 Pipe Hangers and Supports – Materials, Design and Manufacture
 2. MSS SP-69 Pipe Hangers and Supports – Selection and Application
 3. MSS SP-89 Pipe Hangers and Supports – Fabrication and Installation Practices
 4. MSS SP-90 Guidelines on Terminology for Pipe Hangers and Supports
- C. ASTM A123/A123M - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron & Steel Products
- D. ASTM A153/A153M - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- E. ASTM C881/C881M - Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- F. ASCE 7 – Minimum Design Loads for Buildings and Other Structures
- G. International Building Code (2009)
- H. Commonwealth of Massachusetts State Building Code (8th Edition)
- I. 2005 Connecticut State Building Code with 2005 Connecticut Supplement and 2009 Amendments
- J. State of Rhode Island Building Code SBC-1 (2010)

1.4 DESIGN REQUIREMENTS

- A. Contractor shall provide all necessary hangers, supports and braces as needed to provide a fully functional and adequately supported and restrained system.
- B. This Specification requires the delegated design of pipe hangers, supports and bracing. The performance criteria, design requirements and materials of construction

are specified herein. Refer to the Structural Drawings for a list of prohibited and allowed structural components from which piping can be hung, supported or braced. The absence of specific pipe support details shall not relieve the Contractor of the responsibility for designing and providing a fully functional system meeting the requirements of this Specification.

- C. Prefabricated pipe supports shall be provided for all pipes shown on the Contract Drawings. Unless otherwise indicated, the terms “pipe support,” “pipe hanger,” and “pipe guide” shall refer to prefabricated pipe supports, hangers, guides, and braces specified herein.
- D. The term “Pipe Support Design Engineer” shall refer to the Professional Engineer hired by the General Contractor to design the pipe support system.
- E. All structural steel pipe support frames and shop fabricated pipe support assemblies shown on the Contract Drawings are specified elsewhere and not required as part of this Specification.
- F. Pipes supports shall be classified as one of the following:
 - 1. Type 1 – Supported from an overhead structural member using overhead hangers, guides, clevises, rollers, clamps or other means as specified herein.
 - 2. Type 2 - Supported from a structural member below the pipe using guides, rollers, clamps, saddles or other means as specified herein.
 - 3. Type 3 – Supported from an adjacent wall or other vertical structural member using brackets with either Type 1 supports, or Type 2 supports or other means as specified herein.
 - 4. Type 4 – Miscellaneous Pipe Hangers, Supports and Braces not specifically identified above.
 - 5. Additionally, each pipe support shall be classified as one of the following based on function:
 - a. Type S - Simple Support
 - b. Type G - Guide Support
 - c. Type F - Fixed Support
- G. Where flexible joints or couplings are indicated on the Contract Drawings at equipment, tanks, etc., the end opposite to the piece of equipment, tank, etc., shall be rigidly supported, to prevent transfer of system forces to the equipment. No fixed or restraining supports shall be installed between a flexible joint or coupling and the piece of equipment.
- H. All pipe and appurtenances connected to the equipment shall be supported in a manner to prevent any strain or load from being imparted on the equipment or piping system.
- I. Pipe supports shall be provided to minimize forces through valves, split and sleeve type couplings, flexible expansion joints and to minimize all pipe forces on equipment housings. Equipment housings shall not be utilized to support connecting pipes.
- J. Unless otherwise indicated on the Drawings, maximum hanger and support spacing shall not exceed the following:
 - 1. The maximum support spacings is based on the specific pipes being full of liquid without any additional vertical loads or thrusts. The actual required support spacings may be limited to the hangers selected or the presence of additional loads.
 - 2. Supports shall be spaced such that the resulting concentrated load at any suspended (Type 1) support does not exceed 2,000 pound maximum and

combined load shall not exceed 25 pounds per square foot over each slab panel the supports extend into, or as indicated on the Structural Drawings.

3. Pipe alignment guides shall not be used as vertical support of the piping.
 4. Wall penetration sleeves (link-seal type or equivalent) shall not be used as support of the piping.
- K. Contractor shall provide pipe supports at the following locations:
1. At all locations indicated on the Contract Drawings.
 2. At all locations such that the maximum support spacing listed above are not exceeded.
 3. At all locations such that the allowable load capacity of the prefabricated hangers are not exceeded.
 4. At the end of all pipe runs.
 5. At all changes in pipe direction greater than 22 degrees.
 6. Within 1 foot of all valves, couplings, expansion joints and pipe joints.
 7. All other locations deemed necessary by the Contractor, Pipe Support Design Engineer or pipe manufacturer.
 8. Spaced such that the deflection in the pipe under operating conditions does not exceed $L/360$, where L is the distance between supports.
- L. All drilled anchors used in suspended Type 1 and Type 3 pipe supports shall meet the following requirements:
1. All supports shall have a minimum of 2 anchors per support.
 2. Anchors shall be sized such that the ultimate capacity of the anchor is a minimum of 5 times greater than the anticipated design forces (Minimum Factor of Safety of 5).
 3. Anchors shall have a minimum embedment depth of 6 inches, minimum spacing of 6 inches and a minimum edge distance of 6 inches.
 4. Concrete anchors shall either be the epoxy adhesive or expansion anchor type.
 5. Masonry anchors shall either be the epoxy adhesive or expansion anchor type. Masonry cells shall be grouted at the anchors. Drop-in, Toggle or epoxy anchors with screen tubes shall not be permitted.
- M. All pipe supports shall be designed for the following loads:
1. Dead loads (including cement lining, insulation, etc)
 2. Liquid Density – use a liquid specific gravity of 1.10 for water, wastewater and sludges and use the appropriate liquid specific gravity for chemicals, unless otherwise noted
 3. Operational Thrust
 4. Water Hammer Thrust
 5. Thermal forces
 6. Wind Load – In accordance with ASCE 7.
 7. Snow Load – In accordance with ASCE 7.
 8. Ice Load – In accordance with ASCE 7

1.5 SUBMITTALS

- A. Submit a complete set of shop drawings of all items to be furnished under this Section and as required by Section 01340.
- B. For piping systems that require delegated design by a Professional Engineer, submit experience statement from the proposed Pipe Support Design Engineer to

demonstrate compliance with the following criteria prior to submitting any technical information.

1. Engage the services of an independent registered Professional Engineer ordinarily engaged in the business of pipe support systems analysis, to analyze system piping and service conditions and to develop a detailed support system, specific to the piping material, pipe joints, valves and piping appurtenances proposed for use. The proposed Pipe Support Design Engineer shall have at least 5 years of experience in the analysis and design of similar systems, including the use of commercial and custom pipe support and in the use of commercial pipe stress software programs. Firms meeting these criteria include: Newman Associates, LLC., Canton, MA; SAC Incorporated, Williston, VT; NEFCO Tech Sales, East Hartford, CT; or equivalent. The professional engineer shall be registered in the State of Massachusetts.
- C. Technical submittals for all projects shall include the following information:
1. Layout drawings with all pipe supports clearly labeled, located, and coordinated with the tabulated list noted below. Layout drawings shall include both Plan and Section views with the pipe supports clearly labeled in each view. All pipe layout changes proposed by the General Contractor shall be incorporated in the layout and identified as a proposed modification. Layout drawings shall address gravity loads and dynamic loads including thermal effects, pressure thrusts and seismic forces.
 2. Summary of Pipe Hangers, Supports and Bracing: Submit a tabulated list of pipe support information which includes the following information at a minimum:
 - i. Hanger/Support/Brace Number
 - ii. Location
 - iii. Pipe Diameter (nominal ID)
 - iv. Pipe centerline elevation
 - v. Pipe material
 - vi. Additional dead weight (Cement lining, insulation, etc)
 - vii. Lineal foot dead weight of pipe
 - viii. Contents of pipe
 - ix. Total lineal foot weight (dead weight and live weight)
 - x. Length of pipe tributary to support
 - xi. Total gravity and dynamic load at support
 - xii. Type of support (as identified in Section 1.4.B above)
 - xiii. Fixity of support (as identified in Section 1.4.B above)
 - xiv. Structure supporting pipe support (Section 1.4.F above)
 3. Representative catalog cut for each different type of pipe hanger, brace, or support indicating the materials of construction, material finishes, pipe sleeve or insulation information, protective shields, important dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers and/or supports are not suitable, submit detailed drawings showing materials and details of construction for each type of special hanger and/or support.
 4. Representative catalog cuts for accessories (e.g., threaded rod, insulation shields and saddles, never-seize compound, etc.)

5. Letter from the General Contractor stating that the following has been coordinated:
 - i. Each pipe support system will not interfere with the other pipe support or seismic bracing systems.
 - ii. Components from the pipe support systems shall not extend within any means of egress or walking pathways in building spaces or at tanks.
 - iii. Components from the pipe support systems shall not interfere with the normal maintenance or operation of a component or equipment.
- D. After the installation is completed and certified, submit as-built drawings for record purposes.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All uninsulated non-metallic piping such as PVC, CPVC, etc., shall be protected from local stress concentrations at each support point. Protection shall be provided by pipe insulation shields or other methods after review with no exceptions taken by the Engineer. All shields shall cover the pipe where it is in contact with the support.
- B. All insulated pipe shall be furnished with a pipe insulation shield and/or saddle at each pipe support location as specified herein.
- C. All stainless steel piping shall be isolated from all ferrous materials, including galvanized steel, by use of neoprene sheet material and protection shields, similar to above methods.
- D. All vertical pipes shall be supported at each floor or at intervals of not more than 12 feet (whichever is less) by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to ensure rigid construction. All vertical pipes passing through pipe sleeves shall be secured using a pipe collar.
- E. Link-seal compression type wall penetration sleeves shall not be used to support static or dynamic loads. Additional supports shall be provided such that static gravity loads and horizontal dynamic loads are not transferred to these penetration sleeves.

2.2 MATERIALS

- A. Unless otherwise specified herein, pipe hangers and supports shall be standard catalogued components, conforming to the requirements of MSS-SP-58, MSS SP-69 and MSS SP-89.
- B. Pipe hangers, supports, braces and accessories shall be standard catalogued components as manufactured by Anvil International, Inc, Carpenter & Peterson, Inc. or equivalent (metallic pipe) or Jove (non-metallic pipe). Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary.

- C. Materials of all prefabricated pipe hangers, supports, braces and accessories (including bolts, nuts, washers) shall be as follows:
1. For steel, stainless steel, ductile iron, HDPE, FRP and PVC piping:
 - a. Exposed interior spaces subjected to a damp or corrosive environment including the following spaces shall be Type 316 stainless steel.
 - i. Cleanout Manhole
 - ii. Air Release Manhole
- D. Type 1
1. Metallic pipe (Steel, stainless steel and ductile iron):
 - a. Adjustable Clevis Type (Type S) (Pipes greater than 4" diameter):
 - i. Anvil International, Inc. (Fig 260)
 - ii. Carpenter & Patterson Inc. (Fig 100)
 - iii. Or equal
 - b. Adjustable Clevis Type (Type S) (Pipes 4" diameter or less):
 - i. Anvil International, Inc. (Fig 65)
 - ii. Carpenter & Patterson Inc. (Fig 200)
 - iii. Or equal
 - c. Adjustable Steel Yoke Pipe Roll (Type S):
 - i. Anvil International, Inc. (Fig 181)
 - ii. Carpenter & Patterson Inc. (Fig 140)
 - iii. Or equal
 - d. Adjustable Pipe Roll (Type S):
 - i. Anvil International, Inc. (Fig 177)
 - ii. Carpenter & Patterson Inc. (Fig 142)
 - iii. Or equal
 - e. Pipe Clamp (Type F):
 - i. Anvil International, Inc. (Fig 212, Fig 216 or Fig 295 Clamp w/ Fig 272 Eyerod)
 - ii. Carpenter & Patterson Inc. (Fig 175, Fig 298 or Fig 304 Clamp w/ Fig 93 Eyerod)
 - iii. Or equal
 - f. U-Bolt (Type S)
 - i. Anvil International, Inc. (Fig 137)
 - ii. Carpenter & Patterson Inc. (Fig 283)
 - iii. Or equal
 2. Non-Metallic pipe (HDPE, FRP and PVC):
 - a. Adjustable Clevis Type (Type S):
 - i. Jove (Model FS-11)
 - ii. Or equal
 - b. Pipe Clamp (Type F):
 - i. Jove (Model FS-4)
 - ii. Or equal

- E. Type 2
1. Metallic pipe (Steel, stainless steel and ductile iron):
 - a. Pipe Roll Stand (Type S) (Non Adjustable)
 - i. Anvil International, Inc. (Fig 271)
 - ii. Carpenter & Patterson Inc. (Fig 39)
 - iii. Or equal
 - b. Pipe Roll Stand (Type S) (Adjustable)
 - i. Anvil International, Inc. (Fig 274)
 - ii. Carpenter & Patterson Inc. (Fig 40)
 - iii. Or equal
 - c. Pipe Roll Chair (Type S)
 - i. Anvil International, Inc. (Fig 175)
 - ii. Carpenter & Patterson Inc. (Fig 67)
 - iii. Or equal
 - d. Adjustable Pipe Roll (Type S)
 - i. Anvil International, Inc. (Fig 177)
 - ii. Carpenter & Patterson Inc. (Fig 109)
 - iii. Or equal
 - e. Pipe Alignment Guide (Type G)
 - i. Anvil International, Inc. (Fig 255 or 256)
 - ii. Carpenter & Patterson Inc. (Fig 1006 or 1007)
 - iii. Or equal
 - f. Pipe Slide Assembly (welded to pipe) (Type G or F)
 - i. Anvil International, Inc. (Fig 257 or 436)
 - ii. Carpenter & Patterson Inc. (Fig 1010)
 - iii. Or equal
 - g. Pipe Slide Assembly (w/ welded clamp) (Type G or F)
 - i. Anvil International, Inc. (Fig 257 or 436 w/ Fig 432 clamp)
 - ii. Carpenter & Patterson Inc. (Fig 1010 w/ Fig 158 clamp)
 - iii. Or equal
 - h. Floor Mounted Stanchions w/ Adjustable Saddles (Type S)
 - i. Anvil International, Inc. (Fig 63 Stanchion w/ Fig 264 or Fig 265 Saddle)
 - ii. Carpenter & Patterson Inc. (Fig 138 Stanchion w/ Fig 101 or Fig 101U Saddle)
 - iii. Or equal
 - i. Concrete cradles
 - i. Provide as detailed on the Structural Drawings
 2. Non-Metallic pipe (HDPE, FRP and PVC):
 - a. Pipe Slide Assembly (w/ welded clamp) (Type G or F)
 - i. Jove (Model FS-8)
 - ii. Or equal
 - b. Floor Mounted Stanchions w/ Adjustable Saddles (Type S)
 - i. Jove (Model FS-7 with stanchion)
 - ii. Or equal

- c. Concrete cradles
 - i. Provide as detailed on the Structural Drawings
- F. Type 3 (Type S) (all pipes)
 - 1. Wall Bracket
 - a. Anvil International, Inc. (Fig 194, Fig 195 or Fig 199)
 - b. Carpenter & Patterson Inc. (Fig 69, Fig 84 or Fig 139)
 - c. Or equal
 - d. Fabricated brackets may be used in lieu of pre-fabricated brackets. Material shall conform to Part C above.
- G. Accessories:
 - 1. Threaded Rods
 - i. Anvil International, Inc. (Fig 140, 142 or 146)
 - ii. Carpenter & Patterson Inc. (Fig 94 or 133)
 - iii. Or equal
 - 2. Pipe Insulation Shield
 - i. Anvil International, Inc. (Fig 167 or Fig 168)
 - ii. Carpenter & Patterson Inc. (Fig 265GS or Fig 265P)
 - iii. Or equal
 - 3. Pipe Insulation Saddle
 - i. Anvil International, Inc. (Figs 160-166A)
 - ii. Carpenter & Patterson Inc. (Figs 351-357Z)
 - iii. Or equal
 - 4. Anti-seize compound
 - i. Never Seez by Bostik, Inc.
 - ii. Or equal
- H. Miscellaneous Pipe Hangers, Supports and Braces (Type 4 or Custom):
 - 1. Contractor shall provide additional hangers, supports and braces as required that are not classified as Types 1, 2 or 3 above.
 - 2. Materials shall conform to Part C above.
- I. Concrete Anchorage:
 - 1. Epoxy anchors. ASTM C881, non-expanding, two-component epoxy resin with AISC Type 316 Stainless Steel threaded rod with washer nut. Manufactured by Hilti Fastening Systems (HIT RE500SD); Ramset Fastening Systems (Chemset Capsule Series); Power Fasteners (T308 Plus); or equivalent.
 - 2. Expansion anchors. Stainless steel AISI Type 316 for galvanized and aluminum fabrications; cadmium plated for painted steel fabrications. Manufactured by Hilti Fastening Systems (Kwik Bolt III); Ramset Fastening Systems (Tru Bolt Stud Anchor); Power Fasteners (Power Stud); or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install prefabricated hangers and supports in accordance with the pipe support shop drawings, in accordance with MSS SP-89 and as specified herein. Deviations from the shop drawings shall not be permitted without written approval from the Pipe Support Design Engineer.

- B. Hangers shall be used for their intended purpose only. They shall not be used for rigging or erection purposes.
- C. General Contractor shall coordinate the installation of field run conduit, piping and other utilities to avoid interference with the pipe supports.
- D. All pipe supports shall include features to permit adjustments of pipe elevations. Once all piping is properly aligned and at the correct elevations, the supports shall be locked into place. Locking nuts, cotter pins, temporary locking devices and other locking means should be properly engaged. Tack welding shall not be utilized to lock supports in place.
- E. Type 1 hangers using threaded rods shall be attached to the building structure or supplemental framing. Connections to the building structure shall be with beam clamps, welded angles or embedded concrete weld plates or threaded inserts.
- F. Install all drilled anchors in accordance with the anchor Manufacturer's instructions.
- G. Secure Type 2 pipe support to structural supporting member. All pipe supports shall be rigidly anchored to their structural supporting members.
- H. PVC Piping and Fiberglass Piping: Support in strict accordance with the manufacturer's instructions and recommendations for the conditions of operation, temperature and size of pipe. Support in a manner which will prevent subsequent visible sagging of the pipe between supports due to plastic deformation.
- I. All surfaces of steel and aluminum in contact with or embedded in concrete or masonry shall be coated with epoxy paint (min 5 mils dry film thickness).
- J. Drain, waste, and vent piping: Support by adjustable hangers.
- K. Valves, Fittings & Specialties: Independently support pipe connected to pumps, equipment and piping systems.
- L. Temporary pipe supports:
 - 1. General Contractor shall be responsible for providing all temporary pipe supports and rigging.
 - 2. Lay out each section of pipeline and make connections while the pipe is held in temporary supports.
 - 3. After the completion of connections in each section of pipeline, hold the section in place with temporary clamps.
 - 4. Do not remove the temporary clamps until the piping is correctly installed on the permanent supports.

3.2 TESTING

- A. All permanent pipe supports shall be installed prior to testing.
- B. Demonstrate compliance with the requirements of this section with respect to support, pitch, vibration, movement, and expansion and contraction during start-up testing of the equipment and associated piping systems as indicated in Section 01800.
- C. Systems which do not meet the requirements of this section with respect to support, pitch, vibration, lateral movement, and expansion and contraction shall be supplemented with additional braces as required and re-demonstrated until compliance is achieved.

3.3 COATINGS

- A. Provide shop coatings in accordance with manufacturer.
- B. Provide field coatings on surfaces with dissimilar metals. Utilize epoxy paint (minimum 5 mil thickness).
- C. Provide temporary support or bracing as necessary to allow complete and continuous coats.

CERTIFICATE OF DESIGN

RE: Contract between
 OWNER: _____

CONTRACTOR: _____

PROJECT: _____

The undersigned hereby certifies that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the State of _____; (Location of Project)
2. Is qualified by education and training to design the pipe support and bracing system as specified in Section 15094 of subject contract;
3. Has previously designed comparable pipe support and bracing systems;
4. Has prepared the design in full compliance with the requirements of subject contract documents, including all applicable laws, regulations, rules, and codes; and
5. Has confirmed by design that the static gravity loads and dynamic horizontal and vertical seismic, hydraulic pressure, and thrust forces tributary to each pipe support and the system as a whole have been determined, and that all supports, and braces are designed to resist these forces within the allowable capacities of each component of the pipe support, including anchorage. (Excluding supports specifically designed by the Engineer-of-Record Wright-Pierce)
6. Will inspect the completed installation of the pipe support system to confirm that the system is installed and functions in accordance with the design.

CONTRACTOR

PIPE SUPPORT DESIGN ENGINEER

By: _____
(Signature)

By: _____
(Signature)

(Name)

(Name)

(Title)

(Professional Engineer No. and State)

(Date)

(Date)

END OF SECTION

SECTION 02699FLEXIBLE FABRIC REINFORCED PIPE (FFRP) SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide all equipment necessary for CCTV inspection, cleaning and lining the existing 16" and 18" diameter concrete lined ductile iron sanitary sewer force main with Flexible Fabric Reinforced Pipe (FFRP) in accordance with these specifications, contract drawings, manufacturer's instructions and any regulatory requirements.
- B. The FFRP System includes the FFRP Liner Material and the FFRP Connectors.
- C. Work shall be completed to limits shown on the Drawings.
- D. Related Work Specified Elsewhere: Sewer flow control, sewer line cleaning, television inspection, and testing are specified in this Division.

1.2 QUALITY ASSURANCE

- A. FFRP shall be from a single manufacturer.
- B. Inspection of the FFRP will also be made by the Owner or Owner's representative after delivery. The FFRP shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. FFRP rejected after delivery shall be marked for identification and shall be immediately removed from the job site.
- C. Contractor shall be certified by manufacturer.

1.3 SUBMITTALS

- A. Submit specifications and shop drawings for materials and equipment furnished under this Section.
- B. Prior to first shipment of FFRP, submit certified test reports that the pipe for this Contract was manufactured and tested to meet standards specified herein.
- C. Submit FFRP Installation Certifications from the product manufacturer along with the Bid Form.
- D. Submit CCTV of entire length of host pipe, as specified in Section 02753, prior to cleaning and spot repair.
- E. Supply information on proposed or potential spot repair and/or rehabilitation methods in the event of areas of unsuitable host pipe.
- F. Repair options shall be defined based on manufacturer's recommendations, including a detailed step-by-step repair procedure meeting requirements of lining manufacturer.
- G. Submit an outreach plan to the Engineer at least 1 week prior to the commencement of lining activities, this plan shall at minimum include a schedule for 1 week and 24 hour advance notices to residents who will be affected by the pipe lining, and samples of notices to be provided to residents.
- H. Submit materials and installation procedures for review by Engineer, including manufacturer information on liner and resin; safety data sheets; an installation schedule; noise mitigation plan; plans for by-passing or handling of sewer flows; and traffic control.

- I. Submit CCTV of the pipeline after cleaning, specified in Section 02753, prior to authorization to line.
- J. Submit CCTV of entire length of lined pipe as a 1-year warranty inspection as specified in Section 02753.

PART 2 - PRODUCTS

2.1 MATERIALS

A. FFRP Liner Material

1. The FFRP shall be manufactured by Primus Line, produced in Cham, Germany, or approved equal.
2. Contractor shall provide manufacturer's representative tech on site for at least one installation section.
3. The FFRP system shall consist of three layers:
 - a. The outer layer shall be made of an abrasion-resistant polyethylene (PE). The outer PE layer shall be UV resistant.
 - b. The middle (core) layer shall be made of seamless woven aramid fabric, either one or two layers depending on the required pressure. The aramid fabric shall be produced from aramid fibers with a seamless, continuous twill.
 - c. The inner layer shall be made of low-density polyethylene (LDPE).
 - d. FFRP shall use only virgin material suitable to providing predictable manufactured result.
4. The FFRP shall be clearly marked with the following information:
 - a. Nominal composite liner diameter.
 - b. Fluid and MOP (Maximum Operating Pressure for the transported fluid).
 - c. Trade name/trademark.
 - d. Year, Month, and Day of manufacture in the format YYYY.MM.DD.
 - e. FFRP batch number.
 - f. Continuous production run length in feet with the units labelled.
5. For shipment, all FFRPs must be spooled onto transport reels.
6. FFRP shall be capable of passing through multiple 45° bends and capable of passing a single 90° bend with approval of the manufacturer.
7. All layers of the FFRP shall be between 0.24 inches to 0.32 inches thick.
8. FFRP shall have a design service life of minimum 50 years.

B. FFRP Connectors

1. FFRP Connectors shall be specially developed termination fittings designated for the appropriate pressure.
2. FFRP connectors shall be manufactured from either cast iron, carbon steel or stainless steel. Connectors shall have flanges and a full-surface, high quality powder coating that provides corrosion protection on all sides. Flanges used by FFRP must comply with either EN 1092, ANSI B16.5 or AS 4087. All connectors shall be designed preserve the overall integrity and function of the liner.
3. The medium FFRP Connector shall be made of a dimensionally stable profiled internal core and an external sleeve with a deformable metal jacket form.

4. FFRP connectors shall be designed for ease of installation and shall be without leaks.
5. FFRP connectors shall provide a pull-proof connection and create a secure assembly onto the host pipe.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to conducting any work, Contractor shall deliver notices to all residents and/or building owners within the area of the pipe lining. Notice shall indicate when the work will take place and who to call with questions or in the event of an emergency.
- B. Contractor to control sewer flow and bypass pump per Section 02751 and 01515.
- C. Prior to lining the force main pipe, the force main pipe shall be cleaned in accordance with Section 02752 and inspected with CCTV equipment per Section 02753. Contractor to verify that the conditions of the force main pipe is acceptable for the methods of liner installation required. Prior to lining of pipe, Contractor shall make repairs required to avoid damaging the FFRP system.
- D. Pits to access the host pipe must be freely accessible, free of water and in accordance with the requirements of the FFRP system manufacturer.

3.2 INSTALLATION

- A. Installation shall be per liner manufacturer's requirements.
- B. All FFRPs must be handled in accordance to the FFRP Installation Manual.
- C. Inserting of the Liner
 1. The liner shall be folded by the manufacturer. The U-shaped and folded liner shall be spooled onto transport reels and placed at the starting pit of the section. Depending on the reel weight and length, either unwinding rails or unwinding stations shall be used to unwind the liner from the reels.
 2. A winch shall be placed at the destination pit of the pipe section. From there, the rope of the winch shall be pulled through the host pipe to the pit at the starting point.
 3. To navigate bends, either a rope or a pulling head shall be attached to insert the liner. The rope or pulling head shall be connected to the rope of the winch.
 4. An anti-twist device shall be installed between the rope (or pulling head) and the rope of the winch to prevent the liner from twisting while being inserted.
 5. On straight sections, the liner insertion speed shall at no time exceed 32.8 feet per minute.
 6. Through bends, the insertion speed shall at no time exceed 16.4 feet per minute.
 7. Inserting the liner shall be considered complete when at least 10 feet of liner protrudes from the destination access pit without tension.
- D. Inflating the Liner by Means of Compressed Air
 1. Stopper/plugs shall be attached to either end of the liner to create a seal. One of the stopper/plugs shall include a bypass.
 2. Oil-free compressed air shall be to be blown into the bypass and from there into the liner, creating internal pressure.

3. The adhesive tape (maintaining the U-shape) shall begin to break at an internal pressure of 0.5 bar (approx. 7.3 psi).
 4. All of the tape shall have been released when the internal liner pressure is 1 bar (approx. 14.5 psi).
 5. After inflating the liner, the liner can be cut to a length of 3.3 feet projecting the host pipe in both the starting and destination pits. The 3.3 feet of projecting end of liner is required to install the connectors.
- E. Installing the Connectors
1. A two-piece design of connector shall be used.
 2. The liner shall be mechanically sandwiched between an outer sleeve and a connector core.
 3. The outer sleeve shall have either a flange end to be connected to the host pipe or shall be welded to the host pipe.
 4. After attaching the outer sleeve, the liner shall be cut directly at the edge of the sleeve.
 5. A flange shall be attached to the connector core which shall be inserted in the liner or the outer sleeve. The adapter shall be screwed to the connector core.
- F. Pressure and Leak Test
1. To perform the pressure and leak test, a blind flange shall be used to close the flange at the connector core. Another option is to use a dished boiler end to close the welding end of the connector core. The connectors need to be safeguarded with reference to the horizontal forces resulting from the test pressure that the sample was exposed to. Any known method of leak-testing metal and non-metal pipes may be used to test the liner.
 2. Liners shall be tested by using potable water.
 3. Hydrostatic and leakage test shall be conducted in accordance with AWWA Standard C600, and as directed by the Engineer, reference Specification Section 02755 Final Sewer Testing.

END OF SECTION

SECTION 02752SEWER LINE CLEANINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide all equipment necessary for the proper cleaning of the force main prior to closed circuit television inspection and liner installation.
- B. Related Work Specified Elsewhere: Closed circuit television inspection is specified in this Division.

1.2 REFERENCE

- A. The type of pipe cleaning shall be chosen based upon the requirements of the liner manufacturer and be approved by the Engineer.

PART 2 - PRODUCTS2.1 MATERIALS

- 1. Cleaning equipment shall meet the requirements of the liner manufacturer and be approved by Engineer.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Use selected equipment to remove all dirt, grease, rock and other deleterious materials and obstructions.
- B. Host pipe shall be rough cleaned to provide a free inner diameter of the pipe using high water pressure cleaning techniques, or spring steel scrapers and rubber discs.
- C. Stationary obstacles (casting defects, sagging weld seam roots, tuberculation, protruding flanges, screws, pins, plugs, fittings or sacrificial anodes, etc.) protruding from the host pipe wall must be removed by removing the pipe section containing the obstacle or by using a milling robot equipped with diamond tools. Weld seams shall be machined until they are perfectly uniform and flat all the way around.
- D. Protect existing force main from damage caused by improper use of cleaning equipment.
- E. Take precautions to avoid damage or flooding to public or private property being served by the force main being cleaned.
- F. Removal of Materials:
 - 1. Remove all solids and semi-solids downstream of the section being cleaned.
 - 2. Passing material from one section of a line to another will not be permitted.
- G. Disposal of Materials: Remove from the site and dispose of all solids or other waste materials recovered during the cleaning operations in an approved manner.

3.2 DETERMINING TYPE OF CLEANING

- A. All cleaning must be coordinated with Owner and RPR or Engineer verbally or in writing before cleaning commences.

3.3 FIELD QUALITY CONTROL

- A. Acceptance of this portion of the work may be made upon completion of subsequent television inspection and shall be to the complete satisfaction of the Engineer.
- B. Post cleaning CCTV inspection is required to ensure suitability for FFRP installation.

END OF SECTION

SECTION 02753TELEVISION INSPECTION OF SEWERSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish all necessary labor, materials, supervision and equipment to satisfactorily inspect the force main as required by the liner manufacturer by means of a closed circuit television (CCTV) system.
- B. Related Work Specified Elsewhere: Sewer line cleaning and sewer flow control are specified in the appropriate sections in this Division.

1.2 QUALITY ASSURANCE

- A. CCTV work shall be completed and delivered per the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) latest version standards. Operators of CCTV equipment shall be currently certified in NASSCO PACP.

1.3 SUBMITTALS

- A. Provide shop drawings as specified in the General Conditions and Section 01340.
- B. Contractor shall submit copies of active PACP certifications.

PART 2 - PRODUCTS2.1 MATERIALS AND EQUIPMENT

- A. The cameras shall be designed and constructed for force main inspection work. The mechanical design of the lens shall allow it to turn and rotate 360 degrees to provide a close up view of force main pipe walls and connecting pipes. The camera shall be designed to maintain proper orientation of the picture while the lens is turning and rotating.
- B. The cameras shall be operative in 100% humidity conditions.
- C. The lighting for the cameras shall be suitable to allow a clear picture of connecting pipes and the entire periphery of the force main pipe, such that defects can be seen and identified by the liner manufacturer and Engineer.
- D. The lens focus and rotational capabilities and the light intensity will be remotely controlled from an above ground television "studio".
The cameras shall produce a continuous, full color picture with a quality acceptable to the liner manufacturer and Engineer.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Flow Control:
 - 1. 100% of the periphery of the force main pipe shall be visible at all times.
 - 2. For details on sewer flow control, see Section 02751.
- B. Operation:

1. Perform inspection of force main as per liner manufacturer and Engineer.
 2. Move the cameras through the line in either direction at a moderate rate, not to exceed 30 feet per minute, as recommended by NASSCO.
 3. The Engineer may require Contractor to pull cameras back to get a second view of a section of the pipe.
 4. Use manual winches, power winches, television cable reel powered rewinds, high-pressure hose and reels on jet-cleaning trucks, or a flexible pole, to move the camera through the sewer.
 5. If, during the inspection operation, the camera will not pass through the entire pipe section, the Contractor shall set up the equipment so that the inspection can be performed from the opposite manhole on the pipe segment.
 6. The screen monitor and winch operators shall be in full communication at all times.
 7. Remove all wires, screens, sand bags, etc. used in the television inspection process from the sewers at the completion of inspection of each sewer section.
- C. Measurement:
1. Measurement for location of defects, service connections, etc., shall be accurate to two tenths (0.2) of a foot over the length of the section being inspected.
- D. Records:
1. Printed records shall be provided, reflecting location of defects, service connections, etc., and shall be recorded per PACP standards and stored to a NASSCO-certified digital reporting software:
 - a. Keep records and supply to the Engineer when the work has been completed.
 - b. Show the exact location in relation to the starting point, of each defect discovered by the television camera.
 - c. Show locations of connections, unusual conditions, valves, roots, collapsed sections, presence of scale and corrosion, sharp edges, wrinkles in the liner, and other discernible features.
 2. Database
 - a. One copy of the NASSCO PACP Exchange database shall be provided database in digital format (MS Access).
 3. Video / Photographs:
 - a. Two copies of the video shall be provided on a solid state drive acceptable to Engineer, downloaded or output from a NASSCO certified software: one copy to the Engineer and one copy to the Owner.
 - b. The video shall be digitally recorded, indexed by pipe section (labeled by manhole number or other means acceptable to Engineer) and allow for printing of still photographs.
 - c. Photographs shall be printed at Engineer's request and shall be identified on the back as follows:

Date _____; Section: MH# _____ to MH# _____
Diameter of Pipe _____; Distance from MH# _____ is _____ LF
Description of item photographed _____

END OF SECTION

SECTION 02755FINAL SEWER TESTINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
2. Perform testing at a time acceptable to the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
3. Provide all labor, pumps, pipe, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

B. Related Work Specified Elsewhere (When Applicable):

1. Excavation, backfill, dewatering, pipe, pipe fittings and manholes are specified in the appropriate Sections in this Division and/or Division 15.
2. Manhole testing is specified in Section 02601 - Manholes, Covers and Frames.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PERFORMANCE

A. General:

1. All sewers, manholes, and appurtenant work, in order to be eligible for acceptance by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Thoroughly clean and/or flush all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
3. Perform all tests and inspections in the presence of the Engineer and liner manufacturer's representative.
4. Perform testing by test patterns determined by or acceptable to the Engineer.
5. Remedial Work:
 - a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
 - b. Completely retest all portions of the original construction on which remedial work has been performed.
 - c. Perform all remedial work and retesting in a manner and at a time acceptable to by the Engineer at no additional cost to the Owner.

- B. Television Inspection Tests
1. Where television inspection testing is required, test procedures shall be in compliance with the requirements outlined in Specification Section 02753.
 2. No standing water shall be allowed. The presence of standing water may be cause for rejection of that pipe.
 3. Any standing water, detectable leaks, improper joints or any other unacceptable feature detected by the television inspection will be corrected by re-excavation and resetting pipe at no additional cost to the Owner.
- C. Testing Pressure Sewers:
1. The lined pipe to be tested per liner manufacturer's requirements shall be filled with water of approved quality, and all air shall be expelled from the pipe. If blowoffs are not available at high points for releasing air, the Contractor shall make the necessary excavations backfilling and taps at such points and shall plug said holes after completion of the test.
 2. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
 3. Perform pressure and leakage test at 1-½ times the maximum system pressure or 100 psi whichever is greater (based on the elevation of the lowest point of the section under test and corrected to the gage location). Test duration shall be two hours.
 4. While maintaining this pressure, the Contractor shall make a leakage test by metering the flow of water into the pipe. Leakage, if any, shall be equal to or less than the amounts as determined by AWWA C 600.
$$L = \frac{SD\sqrt{P}}{148,000}$$

L = allowable leakage in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure, in pounds per square inch
 5. In addition to meeting the leakage testing above, all joints within chambers and all flanged joints shall have no visible leakage.
 6. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.
- D. Manhole Leakage Testing:
1. Specified in the "Manholes, Covers and Frames" Section in Division 2.

END OF SECTION

SECTION 02866WORK WITHIN RAILROAD RIGHTS-OF-WAYPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Furnish all necessary materials and perform all work under railroad rights-of-way as shown on the Drawings and specified herein.
2. Perform all work to meet requirements of the Railroad. If a conflict exists between this Division and the Railroad requirements, the Railroad requirements shall apply unless specifically noted otherwise. Wherever the Railroad requirements indicate "Owner or its Contractor" the specifications shall be altered to indicate "Contractor".
3. Perform any additional work specifically required by the Railroad.

1.2 INSURANCE AND CERTIFICATES

- A. Obtain and submit to the Engineer all required Federal, State and Municipal permits prior to starting work.
- B. Obtain Worker's Compensation Insurance.
- C. Obtain and submit insurance policies in accordance with Railroad requirements.
- D. All insurance policies shall be in effect before any work is started and remain in effect until formal acceptance of work by the Chief Engineer of the Railroad.

1.3 INSPECTION

- A. If deemed necessary by the Chief Engineer of the Railroad, the Railroad will furnish inspectors and flaggers for the general protection of railroad property and operations. The inspection shall be at the expense of the Contractor.

1.4 SUBMITTALS

- A. Contractor shall submit to the Railroad all drawings, details and associated design calculations deemed necessary by the Railroad.

PART 2 - PRODUCTS2.1 MATERIALS

- A. All materials shall conform to minimum Railroad specifications.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Perform all work in accordance with Railroad requirements.
- B. Perform all work in a manner satisfactory to the Chief Engineer of the Railroad.

END OF SECTION

SECTION 03420PRECAST CONCRETE STRUCTURESPART 1 - GENERAL1.1 SECTION INCLUDES

- A. Precast concrete structures:
 - 1. All circular precast concrete structures with a size greater than or equal to 6'-0" interior diameter (sections assembled vertically). Smaller sections are specified in Division 2.
 - 2. All rectangular or square precast concrete structures of all sizes (monolithic or assembled vertically), except where specified in Division 2.
 - 3. All segmental box type tank structures assembled horizontally.
- B. Joint sealants
- C. Leak testing

1.2 RELATED SECTIONS

- A. Section 01340 - Submittals
- B. Section 02601 - Manholes, Covers and Frames

1.3 REFERENCES

- A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
- B. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials
- C. ACI 301 Specifications for Concrete Construction
- D. ACI 318 Building Code Requirements for Structural Concrete
- E. ACI ITG -7 – Specification for Tolerances for Precast Concrete
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- G. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- I. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain or Deformed, for Concrete
- J. ASTM C33/C33M – Standard Specification for Concrete Aggregates
- K. ASTM C40/C40M – Standard Test Method for Organic Impurities in Fine

- Aggregates for Concrete
- L. ASTM C87/C87M – Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
 - M. ASTM C88/C88M – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - N. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete
 - O. ASTM C131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
 - P. ASTM C150/C150M – Standard Specification for Portland Cement
 - Q. ASTM C260/C260M – Standard Specification for Air-Entraining Admixtures for Concrete
 - R. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
 - S. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete
 - T. ASTM C535 – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
 - U. ASTM C595/C595M – Standard Specification for Blended Hydraulic Cements
 - V. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 - W. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
 - X. ASTM C858 – Standard Specification for Underground Precast Concrete Utility Structures
 - Y. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
 - Z. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
 - AA. ASTM C913 – Standard Specification for Precast Concrete Water and Wastewater Structures
 - BB. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
 - CC. ASTM C989/C989M – Standard Specification for Slag Cement for Use in Concrete and Mortars
 - DD. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - EE. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures
 - FF. ASTM C1260– Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
 - GG. ASTM C1293– Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
 - HH. ASTM C1567– Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar Bar Method)

- II. ASTM C1602/C1602M – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Production
- JJ. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- KK. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
- LL. ASTM D4101 - Standard Specification for Polypropylene Injection and Extrusion Materials
- MM. ASTM E329– Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
- NN. AWS D1.4/D1.4M – Structural Welding Code – Reinforcing Steel
- OO. Concrete Reinforcing Steel Institute - 10MSP, Manual of Standard Practice
- PP. AASHTO HB-17, Standard Specifications for Highway Bridges (17th Edition)
- QQ. Precast/Prestressed Concrete Institute (PCI) – Manual for Quality Control for Plants and Production of Structural Precast Concrete Products (MNL-116)

1.4 DESIGN REQUIREMENTS

- A. All precast units shall be constructed of the shapes and sizes as shown on the Drawings, with interlocking shiplap joints.
- B. Base sections shall be designed and constructed with the floor slabs cast monolithically with the bottom riser section.
- C. In addition to the requirements specified herein, all precast units shall meet the following:
 - 1. Circular units shall meet ASTM C478.
 - 2. Rectangular or square utility units (excluding water and wastewater structures), monolithic or assembled vertically, shall meet ASTM C858.
 - 3. Rectangular or square water and wastewater structures (monolithic or assembled vertically or horizontally) shall meet ASTM C913.
- D. Structural design calculations shall be in accordance with ACI 318 “load and resistance factor design” and include the following loading conditions:
 - 1. For all load cases, the weight of soil shall be taken as 125 pounds per cubic foot.
 - 2. Rectangular or square utility structures shall be designed to the requirements of ASTM C857, except using lateral earth pressure coefficient of 0.50 and AASHTO HS-25 vehicle load.
 - 3. Rectangular or square water and wastewater structures shall be designed to the requirements of ASTM C890, except using lateral earth pressure coefficient of 0.50 and AASHTO HS-25 vehicle load.
 - 4. Circular units shall be designed for an AASHTO H-25 vehicle load plus impact. Wheel loads may be distributed through earth cover in accordance with AASHTO HB-17, ASTM C857, or ASTM C890 provisions. The lateral earth pressure coefficient shall be 0.50, and lateral vehicle surcharge shall be 125 pounds per square foot applied over a minimum depth of 8 feet below the wheel.
 - 5. The following load cases shall be included for all structures, including those designed to the requirements of ASTM C857, ASTM C890, and ASTM C478:
 - a. For liquid-containing structures: full of liquid with no backfill and no load applied to top slab (leak test condition).

- b. For all structures:
 - i. Empty structure with cumulative maximum external vertical and horizontal loads including lateral earth pressure, maximum groundwater elevation, and lateral vehicle surcharge.
 - ii. Empty structure with cumulative maximum external vertical loads and half the maximum lateral earth pressure, no groundwater, and no lateral vehicle surcharge.
 - iii. The forces and distortions applied during curing, stripping, storage, transportation, lifting and erection so that precast members are not overstressed or otherwise damaged.
- 6. Unless otherwise indicated on the Drawings, the maximum groundwater level shall be assumed at finished grade or the flood elevation noted on the Drawings, whichever is higher.
- E. Concrete admixture for microbiologically induced corrosion control shall be included.
- F. Reinforcing Steel:
 - 1. For rectangular and square precast structures, including segmental box type tank structures, and for flat slab tops and bases of circular structures: the minimum steel reinforcement in each direction in slabs and walls shall not be less than 0.0025 times the gross area of the concrete section.
- G. Concrete clear cover on reinforcing steel: 1½ inches minimum.
- H. The interior dimensions of the precast concrete structures shall be as shown on the Drawings. Walls, top slabs and base slabs shall be a minimum of 8” thick.
- I. The precast concrete structure shall be designed to resist flotation:
 - 1. A factor of safety of 1.15 shall be used against flotation based on weights of empty structure and soil directly over footing extensions and above the top slab (if any).
 - 2. Unless otherwise indicated on the Drawings, the maximum groundwater level shall be assumed at finished grade or flood elevation indicated on the Drawings.
 - 3. The base slab may be extended beyond the face of the wall to provide additional resistance to flotation.
 - 4. Unless otherwise indicated on the Drawings, additional cast-in-place concrete base slabs will not be permitted for flotation resistance.
 - 5. Frictional resistance shall not be permitted.
 - 6. Where the structure is composed of successive vertical segments, the weight of the segments shall be such as to provide the same factor of safety for buoyancy, or stainless steel mechanical connections shall be used to connect the segments together. The design shall also include such anchorage to the reinforced concrete anti-buoyancy slab, if such slab is indicated on the Drawings.
 - 7. The buoyant force acting on an object is equal to the weight of the volume of water that is displaced by the object. The actual weight of the same volume determines whether or not the object is buoyant.
 - 8. If the Engineer determines that the submitted buoyancy calculations are incorrect, the Engineer shall direct the Contractor to implement specific measures to counteract buoyancy to the Engineer’s satisfaction. Any and all

costs associated with such measures shall be borne entirely by the Contractor and shall be at no additional cost to the Owner.

- J. Segmental structure joints:
 - 1. Provide waterstop sealants and external sealing bands in all joints to create watertight joints.

1.5 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Submit manufacturer's specifications and instructions for all manufactured materials and products including hatches, sealants, sealing bands, dampproofing, pipe sleeves, flexible wall boots, anchorage hardware and other items. Include manufacturer's certifications and laboratory test reports as required.
 - 2. Submit the proposed erection procedure for precast units, sequence of erection, and required handling equipment.
- B. Shop Drawings:
 - 1. Submit shop drawings showing complete information for the fabrication and installation of precast concrete units.
 - 2. Submit layout drawings prepared and stamped by a Professional Engineer registered in the Project state. Drawings shall include the following information:
 - a. Overall layout drawings of the assembled precast concrete structure including overall dimensions. Provide identification of each precast unit corresponding to the sequence and procedure of installation.
 - b. Drawings of individual members indicating plan and cross section dimensions, locations, sizes, types and details of reinforcement.
 - c. Location and details of anchorage devices that are to be embedded in the precast concrete sections.
 - d. Locations and details of joints including shiplaps and details of mechanical connections.
 - e. Locations of wall penetrations for pipes. All openings shall be cast-in-place at the manufacturing plant. Field coring of pipe penetrations shall not be allowed.
 - 3. Submit structural design and buoyancy calculations. Calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in the Project state. Calculations will be reviewed for consistency with the project intent only. The Professional Engineer stamping the shop drawings and calculations shall be responsible for the design.
 - 4. Submit Concrete Mixture designs including test data that meets the criteria specified in ACI 301, Section 4. Mixture design shall include:
 - a. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
 - b. Cement Manufacturer's Certificates of conformance with ASTM C150/C150M or C595/595M taken during the last 90 days.
 - c. Supplementary Cementitious Materials: Source and test reports with certificates of conformance with ASTM C618 for fly ash and ASTM

- C989/C989M for slag cement for actual material to be used in the Work taken during the last 90 days
- d. Aggregate: data not older than 90 days, except test data for soundness, abrasion, alkali reactivity – not older than 12 months. Fine and coarse aggregate data shall include:
 - i. Sources
 - ii. Specific Gravity
 - iii. Sieve analyses per ASTM C33/C33M, including fineness modulus of fine aggregate
 - iv. Organic impurities for fine aggregate per ASTM C40/C40M
 - v. Aggregate reactivity (fine and coarse aggregate), one of the options provided in Part 2.
 - vi. Soundness per ASTM C88/C88M tested with magnesium sulfate (fine and coarse aggregate).
 - vii. Abrasion for coarse aggregate per ASTM C131/C131M or ASTM C535 (coarse aggregate).
 - e. Product data and Safety Data Sheets for concrete admixtures.
 - i. Microbiologically induced corrosion control (MICC) admixture.
 - (1) Product data, dosage, and instructions for use including storage, preparation prior to dosing, batching sequence, dosing process, and concrete mixing procedures.
 - (2) Letter from MICC admixture manufacturer attached to concrete mixture design stating that the concrete mixture design is compatible for use with the admixture. (MICC admixtures may not be compatible with some commercially available concrete admixtures.)
 - (3) Letter of certification from precaster stating that all requirements of the admixture manufacturer were followed.
 - (4) Concrete batch tickets for each batch of concrete, indicating inclusion of MICC admixture.
 - f. Test reports by testing agencies meeting ASTM E329:
 - i. Test data used to determine the standard deviation used for establishing the required average design strength, and test data documenting that the proposed concrete proportions will produce an average compressive strength equal or greater than the required average compressive strength, shall be from within the previous 12 months.
 - ii. Laboratory trial batch data shall be from within the previous 24 months.
5. Submit past Project list with Owner contact information.
6. Submit letter from precast concrete manufacturer stating:
- a. That all segmental precast concrete structures have been shop assembled prior to shipment and all fabrication and construction and erection tolerances have been adhered to.
 - b. For segmental box type tank structures assembled horizontally include statement that adjacent sections have been marked at the plant with match

points to facilitate field assembly and correct alignment, and have been dry fit assembled at the plant to confirm that the required fit is obtained at each joint.

- c. For structures assembled vertically include statement that adjacent sections have been marked at the plant with match points to facilitate field assembly and correct alignment, and have been dry fit assembled at the plant to confirm that the required fit is obtained at each joint.

1.6 QUALITY ASSURANCE

- A. The manufacturer shall exhibit satisfactory performance on projects of similar magnitude under similar or equal service conditions for a period not less than five (5) years.
- B. For structures specified to meet ASTM C913 the concrete manufacturing plant shall be certified by the Precast/Prestressed Concrete Institute (PCI) Plant Certification Program for Group C1 products. For structures specified to meet ASTM C478 or ASTM C858, the concrete manufacturing plant shall be certified by the National Precast Concrete Association (NPCA).
- C. The precast concrete manufacturing plant shall implement a Quality Control Plan and maintain a permanent Quality Control Manual outlining the quality control procedures used by the plant. The Quality Control Plan and Manual shall adhere to the requirements of MNL-116.
- D. Engineer (or Independent Testing Laboratory) may perform a plant inspection at any time during casting of precast concrete components during the construction period. General Contractor shall notify the Engineer a minimum of 14 days prior to the availability of specific precast components for inspection. After notification, Engineer will notify the General Contractor a minimum of 72 hours prior to the inspection.
- E. Segmental box type tank structures assembled horizontally: adjacent sections shall be marked at the plant with match points to facilitate assembly and achievement of correct alignment. Adjacent sections shall be dry fit assembled at the plant to confirm that the required fit is obtained at each joint prior to shipment to project site.
- F. Structures assembled vertically: adjacent sections shall be marked at the plant with match points to facilitate assembly and achievement of correct alignment. Adjacent sections shall be dry fit assembled at the plant to confirm that the required fit is obtained at each joint prior to shipment to the project site.

1.7 WARRANTY

- A. The Contractor shall provide a one (1) year warranty (from the Date of Substantial Completion) for the following:
 - 1. Cracking, spalling or other surface and structural defects.
 - 2. Separation of joints or misalignment of adjacent units due to faulty precast concrete sections.
 - 3. Leakage through all joints between concrete sections due to faulty materials or improper installation.
 - 4. Microbiologically induced corrosion.
- B. The manufacturer shall repair or replace all defective work at no additional cost to

the Owner within warranty period.

1.8 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be inspected at the project site by the General Contractor for surface and structural defects at the time of delivery. All damaged materials shall be replaced by the Contractor at no additional cost to the Owner.
- B. Store precast concrete units at the project site to ensure against cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at the designated lift points only.
- C. All precast concrete units shall be placed on supports such that they are stored off the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. American Concrete (Superior Concrete, LLC), Auburn, ME, PCI (B2, C1)
- B. Unistress Corp, Pittsfield, MA, PCI (A1,B4,C4A)
- C. Oldcastle Precast, Inc, Avon, CT, PCI (B2,C2,C2A)
- D. Blakeslee Prestress, Inc., Branford, CT, PCI (A1,B4,C4,C4A)United Concrete Products., Inc., Yalesville, CT, PCI (B3,C2) NPCA
- E. J.P. Carrara & Sons, Inc., Middlebury, VT, PCI (A1,B4,B4A,C3,C3A)
- F. E. Dailey Precast, LLC, Shaftsbury, VT, PCI (A1,B3A,C3A)
- G. Strescon Limited, Saint John, New Brunswick, Canada, PCI (A1,B4,C4A)
- H. Fabcon Precast, LLC, Selkirk, NY, PCI (B3, C3A)
- I. Fort Miller Co., Inc., Greenwich, NY, PCI (B1A, C1A)
- J. Dura-Stress, Inc, Leesburg, FL, PCI (A1,B4,B4A,C4,C4A)
- K. George R. Roberts, Sanford, ME, NPCA
- L. Shea Concrete Products, Nottingham, NH, NPCA
- M. Shea Concrete Products, Amesbury, MA, NPCA
- N. Shea Concrete Products, Wilmington, MA, NPCA
- O. Arrow Concrete Products, Granby, RI, NPCA
- P. S.D. Ireland Concrete Construction Corp., Williston, VT, NPCA
- Q. Or equivalent

2.2 MATERIALS

- A. Concrete mixture design shall conform to the following:
 - 1. Minimum compressive strength of concrete at 28-days, (f_c) = 5000 psi.
 - 2. Maximum water/cement ratio = 0.42
 - 3. Cement for all units shall be:
 - a. For wastewater structures: Type II or III portland cement conforming to ASTM C150/C150M or specified blended cements.
 - b. For stormwater structures and for vault-type structures not containing wastewater: Type I, II, or III portland cement conforming to ASTM C150/C150M or specified blended cements.
 - c. Blended cements: ASTM C595/595M (MS) types, excluding type IS (≥ 70) and Type IT ($S \geq 70$). Do not use blended cements conforming to

- ASTM C595/595M if they contain cements conforming to ASTM C1157/C1157M.
4. Supplementary Cementitious Materials:
 - a. Slag Cement: ASTM C989/C989M - Grade 100 or 120.
 - b. Silica Fume: ASTM C1240
 - c. Fly Ash: ASTM C618 - Type F, and alkali content not to exceed 4.0%
 5. The proposed mixture shall contain cementitious materials in the following proportions:
 - a. Portland Cement - No less than 65% of the total by weight.
 - b. Slag Cement - No greater than 35% of the total by weight.
 - c. Fly Ash - No greater than 25% of the total by weight.
 6. Entrained air content of concrete: 6% ± 1.5%. Air entrainment admixture shall conform to ASTM C260/C260M.
 7. Admixtures:
 - a. Low Range Water Reducer (pending verification of compatibility with MICC admixture): ASTM C494/C494M Type A.
 - b. High Range Water Reducer (superplasticiser) (pending verification of compatibility with MICC admixture): ASTM C494/C494M Type F.
 - c. Air entraining agent, visol resin based (pending verification of compatibility with MICC admixture): ASTM C260/C260M.
 - d. MICC: Con^{mic}Shield, as manufactured by ConShield Technologies, Inc. or Xypex Bio-San C500, as manufactured by Xypex Chemical Corporation.
 8. Aggregates
 - a. Prohibited: crushed hydraulic cement concrete and recycled aggregate.
 - b. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM C33/C33M as follows:

SIEVE	PERCENT PASSING			
	NO. 8 (3/8")	NO. 67 (3/4")	NO. 57 (1")	NO. 467 (1 1/2")
1-½ inch	-	-	100	95-100
1 inch	-	100	95-100	-
¾ inch	-	90-100	-	35-70
½ inch	100	-	25-60	-
3/8 inch	85-100	20-55	-	10-30
No. 4	10-30	0-10	0-10	0-5
No. 8	0-10	0-5	0-5	-
No. 16	0-5	-	-	-
No. 50	-	-	-	-

- c. Fine aggregate shall meet FDOT requirements for structural concrete or consist of washed inert natural sand, free from mineral or other coatings, soft particles, clay, loam, organic and other deleterious materials, conforming to the requirements of ASTM C33/C33M as follows:

SIEVE NO.	PERCENT PASSING
4	95 to 100
8	80 to 100
16	50 to 85
30	25 to 60
50	5 to 30
100	0 to 10
200	0 to 3.0

The Fineness Modulus shall be between 2.3 to 3.1. The percentage retained between any two consecutive sieves shall not exceed 45%.

- d. Fine Aggregate testing: Perform the following tests on samples of the fine aggregate:
- i. Organic Impurities (ASTM C40):
 - (1) Color of supernatant liquid above test sample tested in accordance with ASTM C40 shall not be darker than standard (Organic Plate No. 3/Gardner Color Standard No. 11).
 - (2) Use of a fine aggregate failing when tested in accordance with ASTM C40 is not prohibited, provided that, when tested for the effect of organic impurities on strength of mortar, the relative strength at 7 days, calculated in accordance with ASTM C87/C87M, is not less than 95 %.
 - ii. Soundness (ASTM C88/C88M):
 - (1) Fine aggregate sample tested in accordance with ASTM C88/C88M for five cycles using magnesium sulfate (not sodium sulfate) shall have a weighted average loss not greater than 18%.
 - iii. Alkali Reactivity:
 - (1) Use one of the following options:
 - (a) Test aggregate in accordance with ASTM C1293. Aggregate having an expansion less than 0.04% at 1-year is acceptable for use.
 - (b) Test concrete mixture with the aggregates and cementitious materials combination submitted, in accordance with ASTM C1293. Aggregates in mixtures having an expansion of less than 0.04% at **2-years** are acceptable for use. (This option also satisfies coarse aggregate requirements.)
 - (c) Test concrete mixture with aggregates and cementitious materials combination submitted in accordance with ASTM C1567. Aggregates in mixtures having an expansion less than 0.10% at 16 days are acceptable for use. (This option also satisfies coarse aggregate requirements.)

- (d) Test aggregate in accordance with ASTM C1293 at 1-year. If the coarse and fine aggregates are of different reactivity, the level of protection shall be based on the more reactive aggregate. The alkali content contributed by the portland cement shall not exceed 4.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.04% and less than 0.12%, or 3.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.12% and less than 0.24%. The use of aggregate with expansion greater than or equal to 0.24% shall not be permitted.
 - (e) Test aggregate in accordance with ASTM C1260 at 16 days if ASTM C1293 aggregate test data is not available. If the coarse and fine aggregates are of different reactivity, the level of protection shall be based on the more reactive aggregate. The alkali content contributed by the portland cement shall not exceed 4.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.10% and less than 0.30%, and 3.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.30% and less than 0.45%. The use of aggregate with expansion greater than or equal to 0.45% shall not be permitted.
- (2) Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.
- e. Coarse Aggregate testing: Perform the following tests on samples of the coarse aggregate:
- i. Abrasion (ASTM C131/C131M or ASTM C535):
 - (1) Coarse aggregate shall be tested in accordance with either ASTM C131/C131M (aggregate smaller than 1 1/2") or ASTM C535 (aggregate larger than 3/4").
 - (2) Loss of the mass of the coarse aggregate by abrasion shall not exceed 50%.
 - ii. Soundness (ASTM C88/C88M):
 - (1) Coarse aggregate sample tested in accordance with ASTM C88/C88M for five cycles using magnesium sulfate (not sodium sulfate) shall have a weighted average loss not greater than 15%.
 - iii. Alkali Reactivity:
 - (1) Use one of the following options:
 - (a) Test aggregate in accordance with ASTM C1293. Aggregate having an expansion less than 0.04% at 1-year is acceptable for use.
 - (b) Test concrete mixture with the aggregates and cementitious materials combination submitted, in accordance with ASTM C1293. Aggregates in mixtures

having an expansion of less than 0.04% at **2-years** are acceptable for use. (This option also satisfies fine aggregate requirements.)

- (c) Test concrete mixture with aggregates and cementitious materials combination submitted in accordance with ASTM C1567. Aggregates in mixtures having an expansion less than 0.10% at 16 days are acceptable for use. (This option also satisfies fine aggregate requirements.)
 - (d) Test aggregate in accordance with ASTM C1293 at 1-year. If the coarse and fine aggregates are of different reactivity, the level of protection shall be based on the more reactive aggregate. The alkali content contributed by the portland cement shall not exceed 4.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.04% and less than 0.12%, and 3.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.12% and less than 0.24%. The use of aggregate with expansion greater than or equal to 0.24% shall not be permitted.
 - (e) Test aggregate in accordance with ASTM C1260 at 16 days if ASTM C1293 aggregate test data is not available. If the coarse and fine aggregates are of different reactivity, the level of protection shall be based on the more reactive aggregate. The alkali content contributed by the portland cement shall not exceed 4.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.10% and less than 0.30%, and 3.0 lbs per cubic yard of concrete for aggregate with expansion greater than or equal to 0.30% and less than 0.45%. The use of aggregate with expansion greater than or equal to 0.45% shall not be permitted
- (2) Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.

9. Water:

- a. Potable, from a municipal water supply, or
- b. Nonpotable water that meets ASTM C1602/C1602M and the following requirements:
 - i. Chlorides as Cl: 1000 ppm - tested by ASTM C114 or by #4500, Argentometric Method from “Standard Methods for the Examination of Water and Wastewater”.
 - ii. Sulfate as SO₄: 1500 ppm – tested by ASTM D516 or ASTM D4130.
 - iii. Equivalent alkalies (Na₂O + 0.658 K₂O): 300 ppm total alkali – tested by ASTM C114.
 - iv. Total inorganic solids by mass: 5000 ppm – tested by ASTM C1603.

- v. Organic solids by mass: 300 ppm – tested by AASHTO T 26.
 - vi. pH: 4.0 to 9.0 – tested by AASHTO T 26.
 - vii. Presence of oil: none to slight – by visual observation.
- B. Reinforcement:
- 1. Bars: ASTM A615/A615M Grade 60; deformed new materials. Cold-bent in accordance with CRSI 10MSP.
 - 2. Welded wire fabric: ASTM A1064/A1064M. Flat sheets are required; rolls are not permitted.
 - 3. Tie wire: ASTM A1064/A1064M, annealed.
- C. Plates and inserts:
- 1. Plates:
 - a. Provide cast-in-place plates as shown on the Drawings. Plates shall be either:
 - i. ASTM A36/A36M, hot-dip galvanized in accordance with ASTM A123/A123M, or
 - ii. AISI Type 316 stainless steel.
 - 2. Inserts:
 - a. Provide inserts as required for lifting, connections, etc.
 - i. ASTM A123/A123M or A153/A153M hot-dip galvanized, or
 - ii. AISI Type 316 stainless steel.
- D. Manhole Steps:
- 1. Provide manhole steps as shown on the Drawings.
 - 2. Steps shall be constructed of steel reinforced copolymer polypropylene. Steps shall conform to ASTM C478 and the polypropylene shall conform to ASTM D4101.
 - 3. The top surface shall have a molded non-slip surface
 - 4. Step widths shall be between 13.75 inches – 14 inches. Step projects from face of concrete shall be between 5 inches – 6 inches.
 - 5. Steps shall be able to support the following loads in accordance with ASTM C478:
 - a. Minimum pullout load of 300 pounds
 - b. Minimum vertical load of 800 pounds with a maximum permanent deflection of ½ inch
 - 6. Thoroughly clean all surfaces to be embedded with a suitable cleaning agent to ensure that the surfaces are free from all foreign matter such as dirt, oil and grease.
 - 7. All steps shall be cast into walls of the precast section to form a continuous ladder with a distance of 12-inches between steps. Step inserts may be cast into the walls if reviewed with No Exceptions Taken by the Engineer.
 - 8. Acceptable products:
 - a. Model ML-13-NCR by American Step Company, Inc.
 - b. Model P-14938 by Parson Environmental Products, Inc.
 - c. Model PS2-PF by M. A. Industries, Inc.
 - d. Or equal
- E. Aluminum Ladders:

1. Material: Aluminum Alloy 6063-T6 (ASTM B221) or Aluminum Alloy 6061-T6 (ASTM B308).
 2. Finish: Clear Anodized (AA M12C22A41)
 3. Welding: filler alloy 5356
 4. Rails: Minimum sizes L3x3x1/4 with 2'-0" clear opening unless indicated on the Drawings.
 5. Rungs:
 - a. 1-inch square or 1-inch diameter extruded aluminum bar with serrated, corrugated or knurled non-slip surface. Grit tape or grit paint shall not be permitted.
 - b. Prefabricated aluminum rungs with serrated, corrugated or knurled non-slip surface:
 - i. Type 950 Ladder Tread by Wooster Products, Inc.
 - ii. Diamondback by McNichols
 - iii. Traction Tread by McNichols
 - iv. Or equal
 6. Maximum rung spacing 1'-0".
- F. Pipe Openings:
1. Provide formed cast-in-place holes, cored holes, or cast-in sleeves.
 - a. Flexible rubber watertight connectors shall conform to ASTM C923.
 - i. Connectors shall either be cast into the concrete or fastened to the structure with stainless steel expansive sleeves.
 - ii. Pipes shall be fastened to the connector with stainless steel bands.
 - iii. Products:
 - (1) Kor-N-Seal (106-406 Series) by Trelleborg Pipe Seals
 - (2) PSX: Positive Seal by Press-Seal Corporation
 - (3) Z-Lok Connector made by A-Loc Products Inc.
 - (4) Or equal
 - b. Hot-dipped galvanized steel sleeves with a welded waterstop ring centered in the wall.
 - c. Expansive rubber and stainless steel ring to seal annular space between pipe and pipe opening.
- G. Precast Section Joints:
1. Provide rubber sealant and sealing bands at all precast concrete section joints.
 2. Rubber sealants:
 - a. Install solid, continuous flexible butyl rubber sealants in all joints to achieve watertight joints. Install a double row of joint sealants for every manhole joint.
 - b. Sealant shall conform to ASTM C990.
 - c. Sealant shall be sized such that it compresses a minimum of 50% within the joint.
 - d. Sealant shall maintain stability at all temperatures and not shrink or harden over time.
 - e. Acceptable products:
 - i. Kent Seal No. 2 by Hamilton Kent
 - ii. RN 101 Ram-Nek Joint Sealant by Henry

- iii. EZ-STIK or PRO_STIK Butyl Sealant by Press-Seal Corporation
 - iv. Conseal CS-102 (CS-202 when the temperature during installation is less than 30°F) by Concrete Sealants, Inc.
 - v. Or equal
 - 3. Joint Sealing Bands:
 - a. Shall be 12" wide
 - b. Shall conform to ASTM C877 Type III
 - c. Acceptable products:
 - i. EZ-WRAP by Press-Seal Corporation
 - ii. ConWrap CS-212 by ConSeal
 - iii. MacWrap C877 Type III by MarMac Construction Products Co.
 - iv. Or equal
- H. Liquid Asphalt Dampproofing:
 - 1. Apply a two-coat waterborne emulsified-asphalt dampproofing system for all below grade exterior wall surfaces:
 - 2. First coat: Fiber free waterborne emulsified asphalt dampproofing conforming to ASTM D1187/D1187M (Type 1) and ASTM D1227/D1227M (Type 3, Class I). MasterSeal 610 by Master Builders, Sealmastic Emulsion by W.R. Meadows, or equal.
 - 3. Second coat: Waterborne emulsified asphalt dampproofing reinforced by long fibers conforming to ASTM D1187/D1187M (Type 1) and ASTM D1227/D1227M (Type 2, Class I). MasterSeal 614 by Master Builders, Sealmastic Emulsion by W.R. Meadows, or equal.
- I. Hatches: Provide hatches as shown on the Drawings. Integral hatches are furnished under this Section and specified in Specification Section 08305.
- J. Manhole covers and frames: Provide manhole covers and frames as shown on the Drawings. Integral manholes covers and frames are furnished under this Section, and specified in Specification Section 02601 Manholes, Covers and Frames.
- K. Concrete Repair Materials:
 - 1. Grout Paint: Mix 1-part Type II portland cement, 1-part fine sand, and enough water to the consistency of thick paint.
 - 2. Patching Mortar: 1-part of a mixture of white and grey Type II portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.
 - 3. Epoxy Adhesive:
 - a. Two or three-part water-based epoxy bonding agent with cementitious components
 - b. Acceptable products:
 - i. Armatec 110 Epocem by Sika Corporation
 - ii. Corr-Bond by Euclid Chemical Co.
 - iii. MasterEmaco P 124 by Master Builders
 - iv. Or equivalent
 - 4. Repair of random cracks (dry – free of liquid or moisture):
 - a. 2-component, 100% solids, moisture-tolerant, low-viscosity, high-strength, multipurpose, epoxy resin adhesive.
 - b. Acceptable products:
 - i. Sikadur 35 Hi-Mod LV by Sika Corporation

- ii. Eucopoxy Injection Resin by Euclid Chemical Co.
 - iii. MasterInject 1500 by Master Builders
 - iv. Or equivalent
- 5. Repair of random cracks (wet - presence of liquid or moisture):
 - a. Low viscosity polyurethane resin that expands and forms a closed cell foam when it comes in contact with water.
 - b. All cracks that are wet (either damp or leaking) at the time of repair shall be repaired with a material that is specifically intended for wet repair as recommended by the manufacturer.
 - c. Acceptable products:
 - i. SikaFix HH Hydrophilic by Sika Corporation
 - ii. Dural Aqua-Fil by Euclid Chemical Co.
 - iii. MasterInject 1210 IUG by Master Builders
- 6. Repair of minor spalls, honeycombs areas and air voids and cementitious overlays:
 - a. Polymer modified, non-sag cementitious repair mortar with corrosion inhibitor.
 - b. Repair material shall include peastone for repairs of greater depth as required by the manufacturer. For repair areas involving depths generally in excess of three (3) inches, utilize a repair material suitable for the depth of repair.
 - c. Acceptable products:
 - i. SikaTop 122 Plus or 123 Plus by Sika Corporation
 - ii. Tamms Structural Mortar by Euclid Chemical Co.
 - iii. MasterEmaco N 400 MasterEmaco N 400
 - iv. Or equivalent

PART 3 - EXECUTION

3.1 FORMWORK

- A. Forms for manufacturing precast concrete products shall be of the type and design consistent with industry standards and practices.
- B. Forms shall be capable of consistently providing uniform products and dimensions.
- C. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected can cause no product damage

3.2 FABRICATION AND PLACING REINFORCEMENT

- A. Detailing and fabrication of reinforcement shall conform to the CRSI Code of Standard Practice unless otherwise indicated on the Drawings.
- B. Reinforcing steel bars shall be clean and free from loose mill scale and rust and from coatings that reduce bond.
- C. Place reinforcement of structural members on accessory bolsters and chairs. Accessories shall be stainless steel or have plastic tips.
- D. All reinforcing shall have concrete cover specified.
- E. Do not weld reinforcement unless the Engineer takes no exceptions in writing. When permitted, welding shall be in accordance with AWS D1.4/D1.4M.

3.3 PRODUCTION, CURING, FINISHING, REPAIRS AND STORAGE

- A. Production, curing and storage of the precast units shall conform to the provisions of MNL 116.
- B. Production:
1. Each precast concrete unit shall be an integral placement without any construction or cold joints. Base slabs shall be an integral placement with the bottom wall section.
 2. Structures shall be fabricated from the minimum number of precast sections in order to minimize the number of joints. Joints shall be located such that penetrations do not intersect joints.
 3. Tolerances: Fabricate precast units without exceeding the tolerances specified below:
 - a. Rectangular or square utility, water and wastewater units:
 - i. Interior length, width, or height:
 - (1) Less than 5'-0": +/- 1/4"
 - (2) 5'-0" to 10'-0": +/- 3/8"
 - (3) Greater than 10'-0": +/- 1/2"
 - ii. Wall and slab thickness: -3/16", +1"
 - iii. Variation in length of opposite surfaces:
 - (1) Per foot of internal span: +/- 1/8"
 - (2) Span = 7' or less: +/- 5/8"
 - (3) Span > 7': +/- 3/4"
 - iv. Variation from End Squareness (difference in interior diagonal measurements):
 - (1) Measured length less than 10'-0": 1/2"
 - (2) Measured length 10'-0" to 20'-0": 3/4"
 - v. The inside joint seam gap between two adjacent sections before joint sealant is applied shall not exceed 3/8".
 - vi. Offsets in alignment of adjacent members at any joint +/- 1/4".
 - b. Circular structures meeting ASTM C478:
 - i. Interior diameter: +/- 1.0%
 - ii. Thickness of wall and slabs: -3/16", +1"
 - iii. Offsets in Alignment of Adjacent Members at Any Joint: +/- 1/4"
 - iv. The inside joint seam gap between two stacked sections before joint sealant is applied shall not exceed 3/8"
- C. Curing:
1. All exposed precast concrete shall be cured by either:
 - a. Moist curing (steam, ponding or application of burlap kept continuously wet)
 - b. Covering the exposed surface with polyethylene sheets
 - c. Covering the exposed concrete with membrane curing compounds
 - d. Application of steam. This method may only be used after the initial set of the concrete.
 2. Alternate wetting and drying shall not be permitted
- D. Finishing:
1. Unless otherwise indicated all surfaces shall be cast with an "As Cast" finish.

2. All exposed surfaces shall be free of form defects, joint marks and shall be within the color variation as defined by the submitted samples and/or mock-up sample.
 3. Slight color variations, small surface holes (up to ¼ inch diameter) caused by air bubbles will be accepted but no major imperfections, excessive honeycombing, sand streaks or other major defects shall be permitted.
- E. Repairs of Defects at the Plant:
1. Minor defects:
 - a. Surface defects not impairing the functional use or expected life of a precast concrete product as determined by the Engineer shall be considered minor defects.
 - b. Minor defects shall be repaired by a method that does not impair the product and approved in writing by MICC admixture manufacturer.
 - c. All repairs shall be made and identified prior to shipment to the Project site.
 2. Major defects:
 - a. Structural defects in precast concrete products that impair the functional use or the expected life of products as determined by the Engineer shall be considered major defects.
 - b. All precast units with major defects shall be rejected and not delivered to the Project site
- F. Storage:
1. Areas used for storage of products shall be firm enough and level enough to avoid causing damage to stored products.
 2. Products shall be stored on level surfaces in a manner that will minimize damage caused by uneven bearing, improperly located dunnage blocks, stacking products too high or difficulty in handling.

3.4 HANDLING, AND TRANSPORTATION

- A. All precast concrete units shall be lifted using designated pick points and lifting inserts. Extreme caution shall be exercised so as not to damage the units during handling.
- B. Prior to shipment:
1. All precast products shall be inspected by plant personnel to assure design conformance, that all defects have been repaired, that all units have proper identification.
 2. For horizontally installed sections: that all units have proper match marks to facilitate assembly, and units have been dry fit assembled at the plant to ensure proper fit at each joint.
 3. For vertically assembled sections: that all units have proper match marks to facilitate assembly, and units have been dry fit assembled at the plant to ensure proper fit at each joint
 4. Products not conforming to requirements shall be clearly labeled and the defects noted on the inspection report. Only products conforming to the requirements shall be shipped.
- C. Transportation:

1. Precast concrete units shall be properly supported during transportation to minimize potential for damage.
2. Transport units in a position consistent with their shapes in order to avoid excessive stresses that may cause damage. Unique shipping instructions or special stacking may be required for irregularly shaped pieces.
3. Do not transport units until they have been cured for a minimum of 5 days or have reached 75% of their 28-day design strength.

3.5 REPAIR OF UNITS AT PROJECT SITE

- A. Minor defects, as determined by the Engineer, shall be repaired by a method that does not impair the product, and shall be at no additional cost to the Owner. Minor defects:
 1. Form tie holes
 2. Air voids (bugholes) larger than those specified for the required surface finish
 3. Honeycomb areas with a depth less than 1 inch
 4. Blisters
 5. Delaminations
 6. Crusting
 7. Visible construction joints, fins and burs
 8. Non-uniform concrete color and appearance
 9. Floors that are not level
- B. Major defects, as determined by the Engineer, shall not be repaired. Precast units with major defects shall be rejected and removed from the Project site and replaced at no additional cost to the Owner. Major defects:
 1. Random cracks
 2. Excessive cracking (crazing)
 3. Spalls
 4. Air voids (bugholes) and honeycombed areas with a depth greater than or equal to 1 inch

3.6 REPAIR OF SURFACE DEFECTS

- A. Form Tie Holes: After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.
- B. Air voids (bugholes): After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.
- C. Honeycomb areas:
 1. All honeycombed areas shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.
 2. Saw cut a 1-inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather edges shall be allowed.
 3. Remove all loose aggregate paste and debris and scrub clean. Thoroughly wet area to be repaired. Brush and scrub grout paint into the substrate of the area to be repaired.

4. Mix patching mortar using as little water as possible. Allow to stand with frequent manipulation of trowel to achieve stiffest consistency. Blend white and gray portland cement to achieve color match with surrounding concrete.
 5. Prior to the set of grout paint (but after it has cast its water sheen), apply a stiff consistency of patching mortar to the area with a trowel. Leave patched surface slightly higher than surrounding surface. Do not finish for 1 hour minimum. Cure in same manner as adjacent concrete.
- D. Blisters, delaminations and crusting: Repairs shall be similar to those for honeycomb areas. Depth of saw cut shall match the depth of the defective concrete.
- E. Visible construction joints, fins and burrs: Remove by grinding until a smooth uniform surface is attained.
- F. Concrete with an overall non-uniform color or appearance as determined by the Engineer shall be repaired with a complete cementitious overlay. Application of the overlay shall be in strict accordance with the manufacturer's written instructions and recommendations.

3.7 ERECTION OF PRECAST STRUCTURES

- A. The General Contractor shall carefully inspect the precast units delivered to the project site prior to commencing installation, and immediately notify the fabricator of any and all deficiencies such as the absence of marked match points on adjacent sections, sections out of specified tolerances, and improperly fabricated sections so that the fabricator can correct such deficiencies, including replacing sections as required.
- B. Install all precast structures level, plumb and aligned to the elevations and in the locations shown on the Drawings. All precast concrete units shall be lifted using designated pick points and lifting inserts in accordance with the written instructions from the Precast Concrete supplier.
- C. Installation Tolerances: Install precast units without exceeding the tolerances specified in Section 3.3.
- D. Attach precast concrete units to concrete foundations as indicated on the Drawings or as required by the Precast Concrete manufacturer.
- E. Connect adjacent precast concrete units as required by the manufacturer. All units shall fit tight to their adjacent units.
- F. Joints: All joints shall be watertight and shall be sealed as indicated below:
1. Install butyl rubber sealants in all joints. A minimum of 2 rows of sealants shall be applied at each joint.
 2. Install butyl sealing bands around the exterior face of all horizontal and vertical joints to achieve watertight joints. For segmental box type tank structures, install sealing band on the interior face of joints in the base slab.
 3. All sealants and sealing bands shall be installed in accordance with the manufacturer's recommendations.
 4. Install primer as required by the sealing band manufacturer. Primer and sealing band shall be installed within the temperature range recommended by the manufacturer.

5. Sealing bands shall be installed directly over the joints prior to installation of any other straps or anchors and prior to application of field-applied dampproofing.
 6. Apply concrete repair material to all offsets of 1/8" to 1/4" between adjacent precast sections to provide a smooth transition from one precast section to the next prior to applying the joint sealing band.
 7. Joints shall be clear of dirt, snow, ice and other debris prior to installing sealing bands.
- G. After erection is complete, all surface damages to the precast concrete units shall be properly repaired in accordance with this Section. All lifting inserts and holes shall be patched after final installation.

3.8 LIQUID ASPHALT DAMPPROOFING APPLICATION

- A. Apply dampproofing to the exterior surfaces all below grade precast concrete walls and on the top surface of below grade top slabs.
- B. Apply two coats in strict accordance with manufacturer's printed instructions and as specified herein. Clean and prepare surfaces as required.
- C. Do not apply dampproofing at temperatures below 40° F or when temperature is expected to fall below 40° F within 12 hours.
- D. Do not place backfill for at least 48 hours after application.
- E. All damproofing materials spilled on adjacent structures shall be cleaned with a material recommended by the dampproofing manufacturer.

3.9 TESTING

- A. General:
 1. Perform leakage tests on all precast concrete structures indicated below prior to application of dampproofing and installing backfill around the structures. Installing backfill at the ends of box type tank structures prior to the leak test will not be permitted.
 2. All testing must be performed in the presence of the Engineer.
 3. Suitably plug all pipes entering precast concrete tank and brace plugs to prevent blow out.
- B. Leakage Tests:
 1. Fill precast concrete tank with potable water to within one foot below the underside of the top slab. Contractor shall be responsible for providing potable water for the tests.
 2. A period of up to 12 hours may be permitted, if the Contractor so wishes, to allow for absorption.
 3. At the end of the absorption period, refill precast concrete tank with water to within one foot below the underside of the top slab and begin the 4-hour test period.
 4. At the end of the 4-hour test period, refill precast concrete tank to the top of the precast concrete tank cover and measure the volume of water added. The test shall be considered passing if the following conditions are met:
 - a. The drop in the liquid level does not exceed 1/8 inch

- b. There are no visible leaks on exterior surfaces of the tank or through joints.
 - 5. Contractor shall repair all leaks at no additional cost to the Owner. All repair materials shall be reviewed for information only by the Engineer.
 - 6. Precast concrete structures shall be retested subsequent to repairs.
 - 7. Additional tests and repairs will be performed until such time as the structures can demonstrate compliance with the testing requirements.
 - 8. Contractor shall dispose of water in accordance with all applicable local, State and Federal Regulations.
- C. Test Schedule:
- 1. The following structures shall be leak tested:

END OF SECTION

TABLE 1 Classification of Aggregate Reactivity

Aggregate-Reactivity Class	Description of Aggregate Reactivity	1-Year Expansion in Test Method C1293, %	14-Day Expansion in Test Method C1260, %
R0	Non-reactive	<0.04	<0.10
R1	Moderately reactive	≥0.04, <0.12	≥0.10, <0.30
R2	Highly reactive	≥0.12, <0.24	≥0.30, <0.45
R3	Very highly reactive	≥0.24	≥0.45

SECTION 03604NON-SHRINK GROUTPART 1 - GENERAL1.1 SECTION INCLUDES

- A. Cementitious non-shrink grout
- B. Epoxy non-shrink grout

1.2 RELATED SECTIONS

- A. Section 01340 - Submittals
- B. Section 02601 - Manholes, Covers and Frames

1.3 REFERENCES

- A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
- B. ASTM C33/C33M - Specification for Concrete Aggregates
- C. ASTM C109/C109M - Test Method for Compressive Strength of Hydraulic Cement Mortars
- D. ASTM C827 - Test Method for Changes in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
- E. ASTM C1107/C1107M - Specification for Packaged Dry, Hydraulic-Cement Grout (Nonsrink)
- F. CRD-C611 - Test Method for Flow of Grout Mixtures
- G. CRD-C621 - Specification for Non-Shrink Grout

1.4 SUBMITTALS

- A. Submit product data and material safety data sheets for products to be used.
- B. Submit test data when required.
- C. Submit manufacturers installation instructions for products used.
- D. Submit a list of at least five (5) similar installations of the product during the last 5 years.

1.5 QUALITY ASSURANCE

- A. The grout manufacturer shall be ISO 9001 certified and have been in business of manufacturing similar products for over ten (10) years. The manufacturer shall maintain a strict quality assurance program, offer technical services and provide a representative at the jobsite for product training, prior to product installation, upon written request.

- B. Conform to Army Corps of Engineers Specification CRD-C621 and ASTM C1107/C1107M (Grades B or C).
- C. Grouts shall exhibit non-shrink characteristics when tested according to ASTM C827.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original sealed packages or containers, labeled with the manufacturer's identification, printed instructions and batch code.
- B. Store in dry conditions above freezing and below 90°F.
- C. Keep unused portions of opened containers dry and warm.
- D. Store aggregate covered and protected from the elements.

1.7 ENVIRONMENTAL CONDITIONS

- A. Do not place grout when exposed to precipitation.
- B. Place grout when temperature of substrate and ambient air are above 40°F and below 90°F.
- C. Place grout outside these limits when approved by heating substrates, enclosing work, shading, cooling or other measure to mitigate adverse weather conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cementitious grout: consists of premeasured, prepacked flowable cement based grouting material with aggregate requiring only the addition of water.
- B. Epoxy grout: consists of premeasured, prepacked epoxy based grouting material consisting of an epoxy resin, hardener and specially blended aggregates. The ratio of the weight of aggregate to the weights of the combined resin and hardener (fill ratio) shall be maintained.
- C. Aggregates: ASTM C33/C33M fine aggregate, washed.
- D. Pea Stone: ASTM C33/C33M coarse aggregate, size number 8 (max. size 0.375 inches), washed.
- E. Water: Potable, from municipal water supply.
- F. Epoxy resins shall not contain non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other volatile and hazardous diluents are not permitted.
- G. Utilize proper grout for the intended application as recommended by the manufacturer.

2.2 TESTS

- A. All grouts shall achieve a minimum 28 day strength of 6,000 psi according to ASTM C109/C109M.
- B. Grouts when tested by flow cone according to CRD-C 611 shall take more than 20 seconds to flow as a maximum limit on fluidity.
- C. Test grout when requested.

2.3 ACCEPTABLE PRODUCTS

- A. Cementitious Grout
 - 1. Five Star Grout - Five Star Products, Inc
 - 2. Masterflow 928 - BASF / Master Builders
 - 3. NS Grout - Euclid Chemical Company
 - 4. Crystex - L&M Construction Chemical, Inc.
 - 5. Harris Construction Grout – A.H. Harris & Sons, Inc.
 - 6. Or equal
- B. Epoxy Grout
 - 1. HP Epoxy Grout - Five Star Products, Inc.
 - 2. Masterflow 648 CP Plus - BASF / Master Builders
 - 3. E3-HP - Euclid Chemical Company
 - 4. EpogROUT 758 - L&M Construction Chemicals, Inc.
 - 5. Or equal

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Unless otherwise indicated, Follow manufacturer's written instructions.
- B. Concrete surfaces shall be a minimum 28 days old.
- C. Completely remove all loose concrete, aggregate, dust, laitance, dirt, oil, grease and other contaminants by bush-hammering, chipping, brushing, concrete cleaners or degreasers.
- D. Use acceptable mechanical means to obtain clean, sound and rough concrete surfaces, exposing coarse aggregate. Blow surfaces clean of dust and debris using oil-free compressed air.
- E. Surface moisture:
 - 1. Cementitious grout: Soak concrete surfaces thoroughly for a minimum of 8 hours with potable water. Concrete shall be saturated and free of standing water at time of grout placement.
 - 2. Epoxy grout: Do not pre-soak concrete surfaces prior to grout placement. Surfaces shall be visibly dry.
- F. Follow manufacturer's cold and hot weather grouting procedures to maintain all materials and surfaces that contact grout within acceptable temperature ranges. Heat the substrate and surrounding environment to a minimum of 40° F.

3.2 FORMS

- A. Formwork shall be constructed of rigid nonabsorbent materials, securely anchored, watertight and strong enough to resist forces developed during grout placement.
- B. Formwork shall be constructed so that the grout is placed across the shortest distance whenever possible. The clearance between formwork and baseplate shall be sufficient to allow for headbox. The clearance for remaining sides shall be one to three inches.
- C. Height of formwork shall extend a minimum of one inch above the highest point to be grouted.
- D. All formwork shall be coated with a form release agent or plastic sheeting for easy removal. Care should be taken not to contaminate grouting surfaces where bond is required.

3.3 MIXING

- A. Provide an adequate number of mortar mixers in good operating condition for uninterrupted placement. Do not exceed one-half the maximum capacity of the mortar mixer.
- B. Cementitious grout:
 - 1. Pre-wet mortar mixer directly prior to mixing. Empty excess water.
 - 2. Start by adding the minimum amount of premeasured potable water to mixer. While mixing, slowly add grout and mix to a uniform consistency.
 - 3. Mix thoroughly for approximately four to five minutes. To achieve desired consistency, add remaining water as necessary. Do not exceed maximum water content as stated on product packaging or add an amount that will cause segregation.
 - 4. For pours requiring aggregate extension, add clean, damp coarse aggregate before final water adjustment.
 - 5. Do not mix more material than can be placed within the working time of the grout. Do not retemper the mix by adding additional water.
- C. Epoxy grout:
 - 1. Combine resin and hardener into pail containing resin. Mix thoroughly by hand with a paddle or by slow speed mixer until a uniform color (no streaks) is obtained. Avoid air entrapment while mixing. Immediately pour all mixed liquids into mortar mixer. While mixing at a slow speed, slowly add aggregate and mix only until aggregate is completely wet.
 - 2. Do not mix more material than can be placed within the working time of the grout.

3.4 PLACING

- A. Pouring (Cementitious and Epoxy Grout):
 - 1. A headbox or similar device is required for a continuous pour to avoid air pockets under baseplate. All grouting shall take place from one side to the other, maintaining contact with the bottom of the plate at all times.
 - 2. When pouring through grout holes, placement shall proceed continuously with a headbox until the grout has risen in the next hole. Maintain head pressure at initial hole so that grout stays in contact with the bottom of the baseplate at all times.
 - 3. Commence grouting at the next hole with an additional headbox. Continue process, alternating headboxes until grouting is complete.
 - 4. When pouring into the headbox, grout shall be introduced in a manner to avoid air entrapment. Care must be taken during grouting to keep the headbox at least half full of material to ensure even grout flow. If necessary, to assist the flow, a plunger may be used. This procedure shall continue until the grout rises above the bottom edge of the baseplate on the opposite side.
 - 5. Throughout the pour, forms shall be constantly checked for leaks. All leaks shall be sealed immediately.

B. Pumping (Cementitious Grout):

1. The type and size of pump and discharge line used are dependent on the parameters of each installation. Contact the pump and grout manufacturers for recommendations.
2. Pumping raises the grout temperature and shortens the working time while reducing its consistency. Keep mix temperature as cool as necessary, except in cold weather.
3. The grout shall be mixed to a consistency that will not segregate while pumping.
4. The grout shall be passed through a #4 screen prior to placement into the pump hopper.
5. Before pumping, determine the working time under jobsite conditions. Pumpability shall be determined by field testing.
6. The pump shall be positioned to minimize the pumping distance. Keep the discharge line as close to horizontal as possible. All hose connections must be watertight.
7. Immediately prior to pumping, the pump and lines shall be primed with a priming slurry leaving hopper empty to prevent overwatering.
8. Once the pumping has begun, it is important not to use any of the priming slurry from the discharge lines. Grout shall not be used until a uniform consistency is obtained at the discharge nozzle.
9. Provide an adequate volume of mixed grout to keep the pump hopper at least half full. The grout shall be placed into pump hopper in a manner to prevent air entrapment.
10. The discharge nozzle shall be withdrawn only while pumping, keeping it submerged within the grout at all times.
11. When a pump is needed to transport grout and the nozzle cannot be inserted into the cavity being grouted, a headbox is required. The headbox will allow the pour to be continuous, avoiding air pockets under the plate. The grout shall be discharged from the nozzle into the headbox in a manner to avoid air entrapment. The headbox shall be kept at least half full at all times.
12. All grouting shall take place from one side of the plate to the other. Maintain contact with the bottom of the plate at all times to maximize the effective bearing area (EBA).
13. When pouring through grout holes, placement shall proceed continuously until the grout has risen in the next hole. Maintain head pressure at initial hole so that grout stays in contact with the bottom of the baseplate at all times. Commence grouting at the next hole with an additional headbox. Continue process, alternating head boxes until grouting is complete.

C. Dry pack (Cementitious Grout):

1. A dry-pack consistency is achieved when the mixed grout can be squeezed into a ball by hand without crumbling. Only enough water should come to the surface to moisten the hands.
2. Use a ram with a square cut end and hammer to evenly compact the grout against solidly braced backing boards, combining each layer (approximately 1/2 inch thick) to the previously placed layer over its entire surface.
3. Each placed layer shall be visually inspected for placement uniformity.
4. Striking force should be sufficient for compaction of the grout without affecting plate alignment.

5. Placement shall be continuous until grouting is complete.

3.5 FINISHING AND CURING

A. Finishing:

1. Cut grout back from bottom of baseplate to the foundation at approximately a 45° angle. Formwork can be removed for cutback when grout offers stiff resistance, or when cut with a steel trowel, stands up without support. Epoxy grout may be finished flush with the edge of the base plate.
2. Provide smooth finish to exposed grout surfaces.
3. Grout shall not be allowed to remain above the bottom edge of the baseplate.

B. Curing:

1. Cementitious grout shall be moist cured for a minimum of three days. Epoxy grout does not require curing agents.
2. Cementitious Grout shall be protected from excessive evaporation with wet rags prior to set.
3. Grout shall be protected from wind, rain, freezing and vibration until a minimum compressive strength of 1000 psi is achieved.
4. Maintain temperature above 45° F until a minimum compressive strength of 1000 psi is achieved.

END OF SECTION

SECTION 05500METAL FABRICATIONSPART 1 - GENERAL1.1 SECTION INCLUDES

- A.
- B. Steel shapes
- C. Anchor rods for steel that is included in this section
- D. Miscellaneous fabrications
- E. Concrete anchors (post installed)
- F. Fasteners
- G. Surface preparation, shop coatings and galvanizing
- H.

1.2 REFERENCES

- A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
- B. ASTM A29/A29M – Standard Specification for General Requirements for Steel bars, Carbon and Alloy, Hot-Wrought
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
- D. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless
- E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- F. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron & Steel Products
- G. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- H. ASTM A276/A276M – Standard Specification for Stainless Steel Bars and Shapes
- I. ASTM A467/A467M – Standard Specification for Machine and Coil Chain
- J. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- K. ASTM A563/A563M – Standard Specification for Carbon and Alloy Steel Nuts
- L. ASTM A572/A572M – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
- M. ASTM A588/A588M – Standard Specification for High-Strength Low-Alloy

- Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance
- N. ASTM A780/A780M – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - O. ASTM A847/A847M – Standard Specification for Cold-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance
 - P. ASTM A992/A992M – Standard Specification for Structural Steel Shapes
 - Q. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High Strength Low Alloy with Improved Formability, and Ultra-High Strength
 - R. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus
 - S. ASTM B209/B209M – Standard Specification for Aluminum and Aluminum - Alloy Sheet & Plate
 - T. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
 - U. ASTM B244 - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
 - V. ASTM B308/B308M – Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
 - W. ASTM D523 - Standard Test Method for Specular Gloss
 - X. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test
 - Y. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test
 - Z. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
 - AA. ASTM F436/F436M – Standard Specification for Hardened Steel Washers
 - BB. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs
 - CC. ASTM F594 – Standard Specification for Stainless Steel Nuts
 - DD. ASTM F1554 – Standard Specification for Anchor Bolts, Steel 36, 55 and 105 ksi Yield Strength
 - EE. ASTM F3125/F3125M – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 Mpa Minimum Tensile Strength
 - FF. Research Council on Structural Connections - Specification for Structural Joints Using High-Strength Bolts
 - GG. SSPC Steel Structures Painting Council
 - HH. SSPC-SP1 Solvent Cleaning
 - II. SSPC-SP2 Hand Tool Cleaning
 - JJ. SSPC-SP3 Power Tool Cleaning
 - KK. SSPC-SP4 Flame Cleaning of New Steel
 - LL. SSPC-SP5 White Metal Blast Cleaning
 - MM. SSPC-SP6 Commercial Blast Cleaning
 - NN. SSPC-SP7 Brush Off Blast Cleaning

- OO. SSPC-SP8 Pickling
- PP. SSPC-SP9 Weathering and Cleaning
- QQ. SSPC-SP10 Near-White Blast Cleaning
- RR. Aluminum Association Near-White Blast Cleaning
- SS. Aluminum Association Aluminum Design Manual (2010)
- TT. Aluminum Association Aluminum Standards and Data (2009)
- UU. AWS D1.1/D1.1M Structural Welding Code – Steel - American Welding Society
- VV. AWS D1.2/D1.2M Structural Welding Code – Aluminum -American Welding Society
- WW. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel
- XX. American Institute of Steel Construction (AISC) - Manual of Steel Construction (14th Edition)
- YY. AISC 303 – Code of Standard Practice for Steel Buildings and Bridges
- ZZ. AISC 360 - Specification for Structural Steel Buildings
- AAA. AISC Design Guide 27: Structural Stainless Steel
- BBB. National Association of Architectural Metal Manufacturers (NAAMM) Standard Amp 510-92 - Metal Stairs Manual (5th Edition)
- CCC. OSHA Occupational Safety and Health Standards, 29 CFR Part 1910

1.3 DESIGN REQUIREMENTS

- A. Steel Beam Connections: All bolted connections not detailed on the Drawings shall be sized to support one-half the total uniform load capacity as shown in Table 3-6, of the AISC Steel Construction Manual. If standard connections from Tables 10-1, 10-2 or 10-10b from the AISC Manual of Steel Construction are used, references may be made to these tables for each beam with the appropriate connection load in lieu of design calculations.

1.4 SUBMITTALS

- A. Photocopies of Contract Drawings in whole or part will not be accepted as shop drawings.
- B. Submit complete shop drawings showing the following information: ,
 1. Plan layouts showing building grid lines, dimensions, piece designations, and other pertinent information.
 2. Isometric views of framing systems showing building grid lines and piece designations.
 3. Elevations, sections, and details showing general arrangement of pieces with piece designations, dimensions, connections, and other pertinent information.
 4. Details of each piece with designation, length, bolt holes, bolts, copes, welded components, and welds with AWS symbols.
 5. Bill of Materials for all pieces including:
 - a. Piece designation
 - b. Quantity
 - c. Description
 - d. Length
 - e. Material and grade
 - f. Finish
 - g. Weight

6. To facilitate the review process, piece designations shall not be revised in subsequent submittals. Added pieces are to be given designations that do not affect previously submitted piece designations.
- C. Submit product data in accordance with the provisions of Section 01340.
- D. Submit statement that non-welded mechanical aluminum guards and handrails meet OSHA loading requirements for guards.
- E. Submit statement that manufactured guard and handrail mounts meet OSHA loading requirements.
- F. Submit railing samples indicating surface quality, welding and finish when requested by the Engineer.
- G. Submit certification from hot-dipped galvanizing plant stating that hot-dipped galvanizing is in accordance with Specification.
- H. Submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificates shall be accompanied by a current certificate by the welder attesting to the fact that they have been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

1.5 QUALITY ASSURANCE

- A. Conform to AISC Manual of Steel Construction for the design, fabrication and erection of steel.
- B. Conform to AWS D1.1/D1.1M for welding of steel.

1.6 COORDINATION

- A. The Contractor shall coordinate with the work of other Sections. Verify at the site both the dimensions and the work of other trades adjoining items before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.7 FIELD MEASUREMENTS

- A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and conditions and to ensure proper fitting of all items.
- B. Templates of channel and tank configuration shall be made for the installation of grating or checkered plate for the areas to be covered.

1.8 DELIVERY, STORAGE, HANDLING

- A. Coordinate delivery of products.
- B. Protect products from damage prior to and after installation.
- C. Remove damaged material from the site.

PART 2 - PRODUCTS

2.1 STEEL SHAPES

- A. Materials:

1. Wide flange beams (including lintels) ("W" Shapes): ASTM A992/A992M
 2. Angles ("L" shapes): ASTM A36/A36M
 3. Plates: ASTM A572/A572M (Grade 50)
- B. Finish: Hot-Dipped Galvanized: ASTM A123/A123M
- 1.

2.2 PLATES

- A. Includes plates embedded in concrete and other miscellaneous plates not specified elsewhere.
- B. Steel:
1. Material: ASTM A572/A572M (Grade 50)
 2. Finish: Hot-Dipped Galvanized (ASTM A123/A123M)

2.3 FASTENERS

- A. Concrete anchorage:
1. Anchor Rods: Material: ASTM F1554 Grade 36, S1, threaded and headed
 - b. Finish: Hot-Dipped Galvanized ASTM A153/A153M
- B. Bolted Joints:
1. Steel Fabrications (specified in this Section):
 - a. Bolts: ASTM F3125/F3125M Grade A325 Type 1, Style Heavy Hex
 - b. Nuts: ASTM A563/A563M Heavy Hex.
 - c. Washers: ASTM F436/F436M.
 - d. Finish: Hot-dipped galvanized for hot-dipped galvanized steel fabrications (ASTM A153/A153M)
- C. Provide all fasteners with nuts, flat washers and lock washers of the same material as the anchors or bolts. Provide beveled washers for sloped surfaces.
- D. Provide a minimum of 2 fasteners per connection.

PART 3 - EXECUTION

3.1 FABRICATION

- A. All miscellaneous metal members shall fit closely together and shall be straight and true, and the finished work shall be free from burrs, bends, twists, and open joints.
- B. Tolerances:
1. Squareness: 1/8-inch maximum difference in diagonal measurements.
 2. Maximum Offset between faces: 1/16-inch.
 3. Maximum misalignment of adjacent members: 1/16-inch.
 4. Maximum Bow: 1/8 inch in 48 inches.
 5. Maximum Deviation from Plane: 1/16 inch in 48 inches.
- C. All holes, angles, supports, and braces shall be provided as required.
- D. Except as otherwise indicated on the drawings, gusset plates shall have a minimum thickness of 3/8 inch.
- E. Holes shall be made in steel members for attachment of wood blocking, nailers, etc. Holes shall be sized to suit the fasteners indicated on the drawings: where size and spacing are not indicated, holes shall be 9/16-inch diameter, at 3 feet o.c.
- F. Sheared and thermal cut edges shall be true to line and free from rough corners and projections.

- G. Re-entrant cuts/corners shall be filleted to a radius of not less than $\frac{1}{2}$ inch.
- H. Holes shall be punched, subpunched and reamed, or drilled in accordance with AISC "Specifications for Structural Steel." Holes shall not be made by torch cutting.
- I. Holes shall be $\frac{1}{16}$ inch larger than the nominal bolt diameter, except holes for cast-in-place anchor bolts which shall be $\frac{5}{16}$ inch larger than the nominal bolt diameter and as otherwise shown on the Drawings.
- J. The use of oversize or slotted holes not shown on the Drawings shall be subject to prior review by the Engineer.
- K. Bent plate shall be in accordance with AISC "Minimum Radius for Bending."
- L. Column ends bearing upon base and cap plates and beam ends with end plates shall be saw-cut or milled to true surfaces and correct bevels.
- M. Column caps and base plates and beam end plates shall have full contact when assembled.
- N. Welding shall be done in a sequence which minimizes distortion and shrinkage.
- O. Fabrication holes, notches, etc. not required by nor shown on the Drawings shall be subject to prior review by the Engineer.

3.2 CONNECTIONS (GENERAL)

- A. All steel framing connections not detailed on the Drawings shall be either shop-welded, field-bolted or all field-bolted connections designed by the fabricator subject to the provisions of the design drawings, specifications and AISC 360. All connections shall be designed to support [one-half the total uniform load capacity of the framing member as shown in Table 3-6 of the AISC Manual of Steel Construction.] [the reactions indicated on the Drawings]. Fabricator shall use the ASD (Allowable Stress Design) in the connection designs. Connections shall be one of the following:
 - 1. All-bolted double angle connections (Table 10-1)
 - 2. Bolted/welded double-angle connections (Table 10-2)
 - 3. Bolted/welded shear end-plate connections (Table 10-4)
 - 4. Single-plate connections (Table 10-10b)
- B. The axes of axially loaded members which meet at a point shall intersect at the point (unless otherwise indicated).
- C. Except as otherwise shown, where three or more members are joined, their centroidal lines of action shall meet at a common point, and there shall be no eccentricity.
- D. Accessory material not indicated on the design drawings, intended to be left in place on the completed structure by the erector, shall be indicated on the shop drawings. Where so indicated by the Engineer on the shop drawings, such items shall be removed before acceptance of the completed work.
- E. At the time of connecting, all contact surfaces shall be free from loose or non-adherent rust, loose mill scale, oil, grease, dirt, mud, and any foreign matter, coating, or defect that might adversely affect the connection.
- F. At the time of connecting, all faying surfaces at Slip-Critical bolted connections shall be prepared in accordance with the requirements of RCSC Specification Section 3.2.2.

3.3 CONNECTIONS (BOLTED)

- A. All bolted connections shall conform to the following:
 - 1. Steel bolts with steel framing - RCSC Specification.
 - 2. Stainless steel bolts with aluminum framing – Aluminum Design Manual by the Aluminum Association.
 - 3. Stainless steel bolts with stainless steel framing – AISC Design Guide 27.
- B. All connections shall have a minimum of two bolts and the minimum bolt size shall be $\frac{3}{4}$ inch (unless otherwise indicated).
- C. Bolts shall be of proper length, and the end of the bolt shall be at least flush with the outer face of the nut. Bolts projecting more than $\frac{5}{8}$ -inch beyond the face of the nut in exposed work shall be cut off close to the nut as directed by the Engineer. If tension control (twist-off) bolts are used in exposed work in other than Pretensioned and Slip-Critical connections (where the splined bolt extensions are twisted off during installation), the splined bolt extensions shall be removed.
- D. All bolts shall have washers between the tightened element and the structural member. Beveled washers shall be used where flange slope exceeds 1:20.
- E. All bolts or nuts once tightened shall not be loosened then re-used. Care shall be taken not to damage the threads of high strength bolts during installation. Joints shall be properly aligned and drifted and holes reamed, if required, to permit bolts to be slipped into place by hand. No burning is allowed for hole adjustment.
- F. Snug-Tightened Connections:
 - 1. Snug-Tightened condition shall be defined as that tightness attained with a few impacts from an impact wrench or the full effort of an ironworker using an ordinary spud wrench to bring the connected elements into firm contact.
 - 2. All bolts identified as Snug-Tightened shall be tightened to a Snug-Tight condition with either spud wrenches or pneumatic impact wrenches.
 - 3. All bolted connections shall be Snug-Tightened N-type bearing unless otherwise indicated on The Drawings.
 - 4. This type of connection applies to both steel and stainless steel bolts.
- G. Finger-Tightened Connections:
 - 1. Where connections are indicated to be “finger-tight”, the connection is to first be snugged up to ensure that all plies are in contact. The nuts shall then be backed off between one-half and one turn to permit the intended movement of the connection. The bolts shall be provided with double nuts to prevent loosening.
 - 2. This type of connection applies to both steel and stainless steel bolts.
- H. Slip-Critical Connections:
 - 1. Slip-Critical connections shall be provided as follows:
 - a. Where indicated on the Drawings.
 - b. Where oversized holes are used.
 - c. Where slotted holes are used, except where the direction of the applied load is normal to the slot.
 - 2. This type of connection applies to both steel and stainless steel bolts.
 - 3. All bolts in Slip-Critical connections shall be tightened (pre-tensioned) with one of the methods specified in RCSC Specification 8.2.1 through 8.2.4. Minimum bolt pretension shall be per RCSC Specification Table 8.1.

4. Pre-Installation Verification: The fastener assemblies and pre-tensioned installation procedures shall be tested according to the procedures specified in RCSC Specification Section 7, as required by Section 8.2, to verify the minimum bolt pretension forces can be achieved:
 - a. All tests shall be performed by a tension calibrator (such as those manufactured by Skidmore-Wilhelm).
- I. Epoxy anchors shall be tightened to 80% of the epoxy manufacturers recommended maximum torque using a calibrated torque wrench.
- J. An Independent Testing Firm (hereafter referred to as "Inspector"), selected and paid for by the Owner, will inspect the bolted connections in accordance with Section 9 of the RCSC Specification as follows:
 1. Snug-Tightened Connections: The Inspector will visually inspect the Snug-Tightened bolted connections. The visual inspections shall consist of the following (in accordance with Section 9.1 in the RCSC Specification):
 - a. Verification that the proper components were used in the connection.
 - b. Verification that the plies of connecting elements have been brought into firm contact.
 - c. Additional non-destructive tests as required by the Engineer.
 2. Slip-Critical Connections: The Independent Testing Firm, will inspect the Slip-Critical bolted connections in accordance with RCSC Specification Section 9.3.
 3. After inspection, if the joint is satisfactory it shall be marked by the Independent Testing Firm with a symbol which indicates that the work is completed and is satisfactory. If the joint is unsatisfactory, it shall be repaired or removed and replaced with a new bolted connection to the Engineer's satisfaction.
 4. If it is discovered that bolts marked as approved by the Inspector are not in compliance with the requirements of this section and the referenced specification, codes, or authorities, the erector's bolting and inspecting procedures shall be revised as required by the Engineer before any of the remaining bolts are installed.
 5. The Engineer reserves the right to inspect and test all bolted connections. The costs for this additional testing will be borne by the Owner.

3.4 CONNECTIONS (SHOP AND FIELD WELDING OF FERROUS METALS)

- A. Welding shall be only for the connections and assemblages shown on the drawings or specified herein, and shall be performed in the shop, except where specifically noted to be done in the field.
- B. All welding shall be done only by certified welders using welding procedures and welding equipment in accordance with AWS D1.1/D1.1M. Welders employed on the work shall be experienced structural welders, previously qualified by tests as prescribed in AWS D1.1/D1.1M using the base metals and electrodes specified herein.
- C. Welding materials and workmanship shall conform to AWS D1.1/D1.1M. All welds shall be considered Prequalified if they conform to the Pre-qualified joints specified in Chapter 3 of AWS D1.1/D1.1M.
- D. Welding electrodes shall conform to the requirements of AWS D1.1/D1.1M and shall be the E70XX series.
- E. Welding shall be by the manual shielded metal arc process. If the fabricator wishes

to use other processes, full details of materials, equipment, and procedures shall be submitted to and approved by the Engineer before any welding, other than as specified herein, is performed.

- F. All welds shall be free of undercut, unfilled craters, and cracks, and shall have smoothly faired contours. Flux and loose scale shall be removed from previous weld bead before succeeding bead is laid. Exposed welds shall be ground smooth.
- G. All temporary (tack) welds shall meet all the specified requirements of the final welds. Tack welds that will be incorporated into the final weld shall be cleaned and thoroughly fused with final weld. Defective, cracked or broken tack welds shall be removed before final welding. Tack welds not incorporated into the final weld shall be removed.
- H. No welding shall be performed during the following weather conditions:
 - 1. Ambient temperature in the immediate vicinity of the weld is below 0°F,
 - 2. If the welded surfaces are wet or are exposed to rain or snow,
 - 3. High wind velocity. A temporary wind shelter may be used in order to reduce the wind directly exposed to the weld to a maximum of 5 mph,
 - 4. Other inclement conditions that will hamper good workmanship.
- I. Welds other than those indicated on the design drawings may be used only if reviewed and no exceptions are taken by the Engineer.
- J. Welding of shear studs shall be in accordance with Section 7 of AWS D1.1/D1.1M.
- K. When welding is unsatisfactory or indicates inferior workmanship as determined by the Engineer, the welds shall either be repaired or removed and rewelded. Where requirements prescribe the removal of part of the weld or a portion of the base metal, such removal shall be by machining, grinding, chipping or machining. All weld repairs shall be proposed by the General Contractor and reviewed by the Engineer with No Exceptions Taken. Defective or unsound welds shall be corrected either by removing and replacing the entire weld, or as follows:
 - 1. Overlap, excessive convexity or excessive reinforcement: Reduce to size by removal of excess weld metal.
 - 2. Cracks in weld or base metal: The extent of the crack shall be verified by acid etching, MT or PT methods. The crack and sound metal 2 inches beyond each end of the crack shall be removed and re-welded.
 - 3. Excessive concavity of weld or crater, Undersize welds, Undercutting: Clean and deposit additional weld metal.
 - 4. Incomplete fusion, excessive weld porosity or slag inclusions: Remove and replace the defective portions of weld.
 - 5. Removal of adjacent base metal during welding: Clean and reform base metal full size by depositing additional weld metal.
 - 6. Base metals distorted from welding: Straighten by mechanical means or by application of a limited amount of localized heat.
- L. Where work performed subsequent to the making of a deficient weld has rendered the weld inaccessible or has caused new conditions which would make the correction of the deficiency dangerous or ineffective, the original conditions shall be restored by removal of welds or members or both before making the necessary corrections, or else the deficiency shall be corrected by additional work according to a revised design approved by the Engineer.

- M. In the event that faulty welding or its removal for re-welding, shall so damage the base metal that in the judgment of the Engineer its retention is not in accordance with the intent of the Drawings and Specifications, the Contractor shall remove and replace the damaged material at no additional cost to the Owner.
- N. Erector shall perform the following inspection of the welding operation and welds:
 - 1. Verification inspection of the welding materials and procedures and the welder's qualifications,
 - 2. Visual inspection of all shop and field welds at the jobsite,
 - 3. UT (Ultrasonic Testing) of all complete penetration welds
 - 4. Magnetic Particle (MT) of all fillet welds
 - 5. Additional testing, such as PT (Liquid Penetrant Testing), Dye Penetrant Testing (DP), MT or UT may be performed at the discretion of the Independent Testing Firm.
 - 6. Acceptance of welds shall be based on Chapter 6 of the AWS Structural Welding Code.

3.5 ERECTION AND INSTALLATION

- A. All metals shall be properly located, aligned, leveled and plumbed. All items embedded in or connected to other substrates shall be properly coordinated and installed.
- B. General Contractor shall verify elevations of concrete, masonry or other bearing surfaces and locations of anchor rods, bearing plates, and other embedded items. Anchor rod templates shall be used to set anchor rods.
- C. Columns and base plates shall be set and accurately plumbed and leveled.
- D. Installation of grout for the column base plates shall be performed under Section 03604. Structural grouting shall be non-shrink and conform to the requirements of Section 03604. No load shall be applied to grout until five days after the plate has been grouted.
- E. Camber of beams shall be that indicated on the Drawings. Where no camber is indicated, any minor camber resulting from rolling or shop assembly shall be upward.
- F. The use of a gas cutting torch in the field for correcting fabrication errors will not be permitted upon any primary member of the structural framing. The use of a gas cutting torch will be permitted only on secondary members, and then only after the review and no exceptions taken by the Engineer.
- G. Top edge of weir plates shall be set straight, true and accurately to the elevations indicated on the Drawings.
- H. Weir crests shall be adjusted level after filling the tanks with water.
- I. Coat surfaces of the following metals in contact with masonry, concrete, grout or dissimilar metals with Polyamide Epoxy Primer:
 - 1. Cast iron
 - 2. Aluminum
- J. Guards:
 - 1. Splice pipe rails in field with internal sleeves fastened at one end and free at the other end.
 - 2. Install railing in accordance with manufacturer's recommendations.
 - 3. Provide smooth end loops to all cut guards.

4. Provide expansion sleeves in guards for continuous runs greater than 20 feet in length.
- K. Install grating and floor plate angle supports at all perimeters of covered openings. All angles shall be embedded in the concrete unless indicated otherwise.
- L. Attach ladders to structures at a maximum of 4 feet on center unless otherwise indicated.
- M. Safety Gates:
 1. Protect installed product and finish surfaces from damage during handling, storage, and installation.
 2. Install safety gates in accordance with manufacturer's recommendations. Ensure proper fit of the gates within the ladder rails or guard posts.

3.6 GALVANIZING

- A. Acceptable manufacturers:
 1. Duncan Galvanizing, Everett, MA
 2. Connecticut Galvanizing, Glastonbury, CT
 3. V&S Taunton Galvanizing, LLC, Taunton, MA
- B. All galvanizing processes, materials and systems described herein are based on Duncan Galvanizing, Everett, MA. Equivalent systems by other galvanizing plants will be permitted provided they meet the requirements of the Specification.
- C. Provide hot-dipped galvanizing coatings to all structural steel and hardware as indicated on the Drawings and herein. Galvanizing coating shall consist of one of the following products:
 1. Duragalv
- D. Duragalv
 1. Duragalv coating shall consist of a zinc rich galvanized coating surface without additional finishes.
 2. Hot-dip galvanize all fabricated items in accordance with ASTM A123/A123M and hardware items in accordance with ASTM A153/A153M.
 3. Prior to galvanizing, drill vent and drain holes in hollow steel shapes as required by the galvanizer.
 4. Galvanizing process shall consist of the following steps:
 - a. Degreasing - Immerse the steel in an acid degreasing bath or caustic solution in order to remove the dirt, oil, and grease from the surface of the steel. After degreasing, the steel is rinsed with water.
 - b. Pickling – Immerse the steel in an acid tank filled with either hydrochloric or sulfuric acid, which removes oxides and mill scale. After all oxidation has been removed from the steel, it is again rinsed with water.
 - c. Fluxing - Immerse the steel in an acid tank filled with a combination of zinc chloride and ammonium chloride. The flux shall clean the steel of all oxidation developed since the pickling of the steel and to create a protective coating to prevent the steel from any oxidizing before entering the galvanizing kettle.
 - d. After being immersed in the Degreasing, Pickling, and Fluxing tanks, the surface of the steel shall be completely free of any oxides and any other contaminants that might inhibit the reaction of the iron and liquid zinc in the galvanizing kettle.

- e. Galvanizing – The galvanizing process shall include the following steps:
 - i. Immerse the steel in a galvanizing kettle containing liquid zinc.
 - ii. The zinc shall be at least 98% pure and shall be heated to a temperature ranging from 820-860 F, at which point the zinc is in its liquid state.
 - iii. The steel products shall be immersed into the galvanizing kettle and remain in the kettle until the temperature of the steel has reached the temperature required to form a hot-dip galvanized coating.
 - iv. Once the inter-diffusion reaction of iron and zinc is completed, the steel product is withdrawn from the zinc kettle.
 - v. Excess zinc shall be removed by draining or vibrating.
 - vi. The finished product shall be inspected by using a variety of simple physical and laboratory tests to determine thickness, uniformity, adherence and appearance.
 - 5. Fill vent holes after galvanizing, if applicable, and grind smooth.
 - 6. Galvanize items after assembly when possible.
 - 7. Galvanizing shall provide a visually acceptable coating and shall be free of lumps, globules, sharp edges or heavy deposits which will interfere with intended use or aesthetic appearance of materials. The Galvanized surface shall exhibit a rugosity (smoothness) of 4 rug or less (16-20 microns of variation) when measured by a profilometer over a 1-inch straight line on the surface of elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.
 - 8. Warranty: Provide galvanizer's standard warranty stating that finished galvanized surfaces will be free from 10 percent or more visible rust for 20 years.
 - 9. Warranty: Provide galvanizer's standard warranty stating that finished galvanized and coated surfaces will be free from 10 percent or more visible rust for 20 years.
- E. Galvanizing Thickness
- 1. The minimum thickness of zinc coating (in ounces/square foot) on steel shapes shall conform to Table 1 below:

Table 1 - Zinc Coating Thickness (oz/sf)				
Steel Shape	Metal Thickness (in)			
	1/16-1/8	1/8-3/16	3/16-1/4	>1/4
Shapes and Plates	1.0	1.7	2.0	2.3
Strips and Bars	1.0	1.7	2.0	2.3
Pipe and Tube	1.0	1.7	1.7	1.7

- 2. The minimum thickness of zinc coating (in ounces/square foot) on steel fasteners shall conform to Table 2 below:

Table 2 - Zinc Coating Thickness (oz/sf)		
Fastener	Average of Specimen	Individual Specimen

Class A – Castings: Malleable Iron and Steel	2.0	1.8
Class B – Rolled, pressed and forged articles		
B1 - 3/16-inch and over in thickness and over 15 inches in length	2.0	1.8
B2 - Under 3/16-inch in thickness and over 15 inches in length	1.5	1.25
B3 – Any thickness and 15 inches and under in length	1.3	1.1
Class C - Fasteners over 3/8-inch diameter. Washers 3/16 inch and ¼-inch thick	1.25	1.0
Class D - Fasteners 3/8-inch and under in diameter, rivets and nails. Washers under 3/16-inch in thickness	1.0	0.85

- F. Touch up and repair: After erection, touch-up all damaged galvanized and coated surfaces and field welds as follows:
1. Unless otherwise indicated, all touch up and repairs to galvanized surfaces shall be in strict accordance with the manufacturer’s recommendations.
 2. Surfaces to be reconditioned with zinc-rich paint shall be clean, dry, and free of oil, grease and corrosion.
 3. Areas to be repaired shall be power disc sanded to bright metal. To ensure that a smooth reconditioned coating can be effected, surface preparation shall extend into the undamaged galvanized coating.
 4. At galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A780/A780M. Galvanizing repair paint shall have 65-95 percent zinc by weight.
 5. The paint shall be spray applied in multiple coats until a dry film thickness of 4-6 mils minimum has been achieved.
 6. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.
 7. Repair Paint:
 - a. ZIRP by Duncan Galvanizing
 - b. Tneme-zinc by Tnemec
 - c. Or equivalent

3.7 CLEANING

- A. Clean surfaces of all work of this section as well as the areas in the vicinity.

3.8 PROTECTION

- A. Protect installed work from:
1. Splatter or debris from adjacent construction.
 2. Excess construction loading and use.

END OF SECTION

system thermal effects, pressure thrusts and seismic forces. Refer to paragraph 1.4 Seismic Control for seismic requirements.

- J. Each piping system shall be presented in an isometric graphic and shall show the resolved and resultant force and moment systems as well as all recommended hangers, supports, anchors, restraints and expansion/flexible joints.
- K. Submit complete layouts, schedules, and location plans for all piping systems.
- L. Submit complete piping drawings for each piping submittal indicating type of hanger and/or support, location, magnitude of load transmitted to the structure and type of anchor, guide and other pipe supporting appurtenances including structural fasteners.
- M. Submittal shall include catalog cut for each different type of pipe hanger or support indicating the materials of construction, dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers and/or supports are not suitable, submit detailed drawings showing materials and details of construction for each type of special anchor and/or support.
- N. Summary of Contractor selected related components including joints, class, valves, appurtenances, etc., and commercial supports and piping materials.
- O. Coordinate piping support arrangements to eliminate interference with similar systems to be installed under HVAC, Plumbing, Fire Protection and Electrical; to account for structural expansion joints and to maintain access for both personnel and for removal of equipment.
- P. After the work is installed, but before it is filled for start-up and testing, the support system design engineer shall inspect the work and certify its complete adequacy. Each system shall be inspected and certified in the same way. Submit a report, including all field modifications and all certificates.

1.4 SEISMIC CONTROL

- A. Not applicable.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.
- B. Do not drop pipe and fittings.
- C. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as required by the Engineer.
- D. Assure that materials are kept clean and dry.
- E. Do not store materials directly on the ground.
- F. Follow manufacturer's specific instructions, recommendations and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials are specified in the following Sections in this Division.

2.2 BOLTS, ANCHOR BOLTS AND NUTS

- A. Furnish all necessary bolts, anchor bolts, nuts, washers, lock washers or locking nuts, plates and bolt sleeves in accordance herewith. Anchor bolts shall have suitable washers, lock washers and, where so required, their nuts shall be hexagonal.

- B. All bolts, anchor bolts, nuts, washers, lock washers, plates, and bolt sleeves shall be carbon steel unless otherwise indicated below or as specified elsewhere.
 - 1. Stainless steel hardware (minimum of Type 304, unless otherwise indicated) is required in all corrosive atmospheres, exterior areas, and/or areas with NEMA 4X or NEMA 7 rating.
 - 2. Stainless steel hardware (minimum of Type 316, unless otherwise indicated) is required in all submerged applications as well as in wetwells, headworks, dewatering rooms, chemical rooms, clarifiers, aeration basins, splitter structures, equalization or storage tanks, etc. For additional description and definition of submerged surfaces refer to Specification Section 09900.
- C. Unless otherwise specified, stud, tap, and machine bolts shall be of the best-quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to AN Standard B 1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).
- D. All bolts shall be suitable size for the intended purpose, with direct input from the product manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
 - 1. Defects and damage.
 - 2. Deviations beyond allowable tolerances for joint dimensions.
 - 3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
 - 1. Defects, such as weak structural components that adversely affect the execution and quality of work.
 - 2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of this Contract will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

3.2 INSTALLATION

- A. General:
 - 1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as specified herein.
 - 2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
 - 3. Install adapters, acceptable to the Engineer, when connecting pipes constructed from different materials.
 - 4. Support all piping not being installed in trenches in accordance with the "Pipe Hangers & Supports" Section in Division 15.
- B. Installation in Trenches:

1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
 2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
 3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
 4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
 5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
 6. Set the pipe true to line and grade.
 7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
 8. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.
 9. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
 10. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
 11. Take all necessary precautions to prevent floatation of the pipe in the trench.
 12. Bedding and backfill for all pipe materials shall be as specified in Section 02200, Earthwork, and as shown on the Drawings.
- C. Temporary Plugs:
1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
 2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
 3. Do not use the pipelines as conductors for trench drainage during construction.

3.3 CLEANING AND TESTING

- A. Cleaning & Testing Piping - General:
1. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
 2. When the installation is complete, test all pipelines in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner. When requested by the Engineer or local plumbing inspector, building gravity drains shall be tested prior to backfilling or concealing. All other piping must be tested after backfilling.
 3. Equipment: Supply all labor, equipment, materials, taps, gauges, and pumps required to conduct the tests.
 4. Retesting: Perform all retesting required by the Engineer at no additional cost to the Owner.
- B.

- C. Outside Sewer Lines (CLASS II): CLASS II pipe testing shall be performed in accordance with Section 02755.

END OF SECTION

SECTION 15062DUCTILE IRON PIPE & FITTINGS
(INTERIOR/EXPOSED APPLICATIONS)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install ductile iron pipe and fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Pipe and Pipe Fittings - General is specified in Section 15050.
 - 2. Ductile Iron Pipe & Fittings for Buried Applications is specified in Section 02615.

1.2 QUALITY ASSURANCE

- A. Standards (As Applicable):
 - 1. Cement-mortar lining for water: ANSI A21.4 (AWWA C104).
 - 2. Rubber gasket joints: ANSI A21.11 (AWWA C111).
 - 3. Ductile iron pipe thickness: ANSI A21.50 (AWWA C150).
 - 4. Ductile iron pipe centrifugally cast in metal or sand lined molds: ANSI A21.51 (AWWA C151).
 - 5. Pipe flanges and fittings: ANSI B16.1 and ANSI A21.10 (AWWA C110).
 - 6. Threaded, flanged pipe: ANSI A21.15 (AWWA C115).
 - 7. Cast and ductile iron fittings: ANSI A21.10 (AWWA C110).
 - 8. Ductile Iron Compact Fittings: ANSI 21.53 (AWWA C153).
- B. Acceptable Manufacturers:
 - 1. Tyler Union
 - 2. Griffin
 - 3. US Pipe
 - 4. Victaulic Company (fittings only, where allowed)
 - 5. Or equivalent.

1.3 SUBMITTALS TO THE ENGINEER

- A. In accordance with the requirements specified in Section 01340. Submit such shop drawings, manufacturer's literature, short-term and long-term storage requirements, and operations and maintenance manuals.
- B. Additional specific information for submittal is listed below:
 - 1. Submit Manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these specifications.
 - 2. Submit Manufacturer's installation instructions for all pipe and fittings.

1.4 DELIVERY, STORAGE & HANDLING

- A. Exercise extra care when handling cement lined pipe because damage to the lining will render it unfit for use.
- B. Protect the spherical spigot ends and the plain ends of all pipe during shipment by

wood lagging securely fastened in place.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. General:

1. Unless otherwise shown on the Drawings, the minimum thickness of ductile iron pipe shall be Class 53.
2. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
3. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings and AWWA C606.
4. The outside of all interior pipe shall be coated in accordance with Section 15050.

B. Pipe Interior Lining:

1. Pipe shall be double thickness cement lined and seal coated unless noted otherwise on the Drawings and except for air piping lines which shall be completely unlined.
2. When required, glass lining shall meet the following requirements:
 - a. Glass lining shall be fused to metal base by firing entire pipe or fitting to a temperature above 1,400 degrees F and held at that temperature for sufficient time to develop a smooth vitreous lining which has a molecular bond to the metal.
 - b. Glass lining shall be a minimum of 0.008-inch thick and shall be capable of withstanding an instantaneous thermal shock of 350 degrees F temperature differential without crazing, blistering or spalling. Lining shall be free of pinholes which expose the metal.
 - c. Glass lining shall have a hardness of 5-6 on the Mohs scale and a density of 2.5 to 3.0 grams per cubic centimeter.

C. Joints (as shown on Drawings or as specified):

1. Flanged:

- a. Provide specially drilled flanges when required for connection to existing piping or special equipment.
- b. Flanges shall be flat face, long-hub screwed tightly on pipe by machine at the foundry prior to facing and drilling.
- c. Gaskets:
 - i. Full face gaskets only.
 - ii. Thickness of gaskets - Use standard 1/8-inch thickness gaskets, unless thinner gaskets are required for tight retrofit installations.
 - iii. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 250°F.
- d. Fasteners:
 - i. Make joints with bolt, studs with a nut on each end, or one tapped flanged with a stud and nut.
 - ii. The number and size of bolts shall meet the requirements of the

- applicable ANSI standard.
- iii. Nuts, bolts, and studs shall be Grade B meeting the requirements of ASTM A307.
 - e. When applicable, provide and install flange clamps as shown on the Drawings.
2. Grooved Joint Couplings: Couplings shall consist of two or more ductile iron housing segments to ASTM A536, pressure responsive FlushSeal gasket to ASTM D2000, and zinc electroplated steel bolts and nuts to ASTM A449 or stainless steel to ASTM F593.
- a. For direct connection to grooved end IPS/steel pipe sizes transition couplings may be used. The coupling housings shall be cast with offsetting angle-pattern bolt pads for joint rigidity.
 - b. Split ring couplings, sleeve couplings, flexible joints and couplings, shall be supplied as specified in "Couplings and Connectors" Section.
 - c. All grooved joint couplings, fittings, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - d. All castings used for coupling housings, and fittings shall be date stamped for quality assurance and traceability.
3. Joint Bracing:
- a. Provide joint bracing to prevent the piping from pulling apart under pressure as required and as shown on the Drawings.
 - b. Types of bracing:
 - i. Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with bituminous paint in buried installations and shall be coated with the same coatings as the piping system in interior installations after assembly or, if necessary, prior to assembly.
 - ii. Other types of bracing as shown on the Drawings.

2.2 FITTINGS

A. Standard Fittings:

1. Either gray cast iron or ductile iron fittings may be furnished.
2. Pressure rating of 250 psi unless indicated otherwise on the Drawings or as specified.
3. Flange fittings shall be ANSI B16.1, Class 125 unless indicated otherwise. Flanges shall be flat faced, with full face gaskets.
4. Grooved end fittings shall comply with ANSI A21.10/AWWA C110 for center-to-end dimensions, and ANSI A21.10/AWWA C110 or AWWA C153 for wall thickness. Ends shall comply with AWWA C606, and the fittings shall be of the same manufacturer as the grooved components.

5. Joints the same as the pipe with which they are used or as shown on the Drawings.
 6. Provide fittings with standard bases where shown on the Drawings.
 7. Cement lining and seal coat unless noted otherwise on the Drawings, and except for air piping applications where the fittings shall be unlined.
 8. All interior fittings shall receive coating in accordance with Section 15050.
 9. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F. to 250° F.
- B. Non-Standard Fittings:
1. Fittings having non-standard dimensions shall be subject to the Engineer's review and acceptance.
 2. Non-standard fittings shall have the same diameter and thickness as standard fittings and shall meet the specification requirements for standard fittings.
 3. The lengths and types of joints shall be determined by the particular piping to which they connect.
 4. Flanged fittings not meeting the requirements of ANSI A21.10 (i.e., laterals or reducing elbows) shall meet the requirements of ANSI B16.1 in Class 125.
- C. Wall Castings:
1. Size, type and location as shown on the Drawings.
 2. Dimensions shall conform to ANSI A21.10 except where required. A flange substantially flush with the face of a concrete or masonry wall shall be drilled and tapped for studs.
 3. Other dimensions shall be identical to the corresponding parts of standard bell and spigot fittings.
 4. An intermediate sealing and anchoring collar not less than 0.38-inch thick up to 36-inch diameter pipe and not less than 0.5-inch thick for 42-inch diameter pipe and larger. The intermediate sealing and anchoring collar to be the same diameter as a flange shall be cast on the barrel at a point that will locate it midway through the wall to form a waterstop.
 5. Alternate wall sleeve system as manufactured by Omni Sleeve, Malden, MA can be utilized as approved by Engineer, in place of above specified wall casting system.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
 2. Deviations beyond allowable tolerances for pipe clearances.
- D. Immediately remove all rejected materials from the project site.

3.2 INSTALLATION

A. General:

1. Install in strict accordance with the pipe and fitting manufacturer's instructions and recommendations and as specified or as shown on the Drawings.
2. Acceptable thrust resistant system is required at all fittings on pressure pipe.

B. Assembling Joints:

1. Flanged Joints:

- a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
- b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.

2. Grooved Joints:

- a. Grooved joint shall be installed in accordance with the manufacturer's written recommendations.
- b. Grooved ends shall be clean and free from indentations, projections, or roll marks.
- c. The gasket shall be molded and produced by the coupling manufacturer of an elastomer suitable for the intended service.
- d. The coupling manufacturer's factory trained representative shall provide on-site training for the contractor's field personnel in the use of grooving tools and installation of product. The representative shall periodically visit the job site to ensure best practices in grooved product installation are being followed. (A distributor's representative is not considered qualified to conduct the training.)

3. Bolted Joints:

- a. Remove rust preventive coatings from machined surfaces prior to assembly.
- b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
- c. All stainless steel fasteners for piping and supports shall be hand tightened to limit the potential for galling.

C. Fabrication:

1. Tapped Connections:

- a. Make all tapped connections as shown on the Drawings or as required by the Engineer.
- b. Make all connections watertight and of adequate strength to prevent pullout.
- c. Drill and tap normal to the longitudinal axis of the pipe.
- d. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANSI A21.51 based on 3 full threads for ductile iron.
- e. Taps in fittings shall be located where indicated by the manufacturer for that particular type of fitting.

D. Castings in Masonry:

1. Accurately set and align castings to be encased in masonry.

2. Thoroughly clean castings immediately prior to being set in place. Remove all rust, scale and other foreign material.

END OF SECTION

