CITY OF ABERDEEN

Harford County, Maryland

PROJECT MANUAL

FOR

DEPARTMENT OF PUBLIC WORKS

NORTHEAST TANK ALTITUTE VALVE VAULT
CONTRACT NO. 21-02

Engineer's Project No. 05233.24B
Drawing No. S-4527B

July 2020

ARRO Consulting, Inc.
108 West Airport Road
Lititz, PA 17543
(717) 569-7021

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SPECIFICATIONS

DOCUMENT 00010

INVITATION TO BID

Project: **NORTHEAST TANK ALTITUTE VALVE VAULT - CONTRACT NO. 21-02:** Project generally comprises installation, at the Northeast Tank, of an altitude valve and related piping and controls, within a precast concrete vault and restoration to seeded and other areas disturbed by construction operations.

The Work will be performed under one Contract as follows:

General Construction.

Owner: **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

Engineer: **ARRO CONSULTING, INC.**
108 West Airport Road
Lititz, PA 17543
Telephone: 717-569-7021
Fax: 717-560-0577

Sealed Bids will be received by the Owner at the address shown above until 2:00 P.M., prevailing time, September 17, 2020, at which time they will be publicly opened and read. Bidding documents are available online free of charge at HTTPS://Aberdeenmd.gov/bids. Online registration is required. Please contact Shawn Brogan, Procurement Officer at 410-272-1600 x 223 for further information.

Envelopes containing the bid shall be sealed and addressed to Shawn Brogan, at City Hall, address shown above, and shall be clearly and distinctly marked to say **"Northeast Tank Altitude Valve Vault – Bid No. 21-02".**

A pre-bid meeting will be held at 10:00 AM, prevailing time, August 25, 2020 at the office of the Owner. **Attendance at the pre-bid meeting is mandatory.** Bids from parties not present at the meeting and site visit will not be accepted.

Technical questions shall be directed, by e-mail only, to Brian Panther at Brian.Panther@arroconsulting.com at the office of the Engineer.

Questions will be accepted until 4:00 PM prevailing time, September 3, 2020.

Reproduction of the Bidding Documents, or their placement on web sites of prospective bidders and other entities, is not permitted.

Bids from prospective Bidders who have not obtained complete sets of Bidding Documents, only from the City of Aberdeen, will not be accepted.

It is a requirement of this Contract that Bidders shall have a minimum (5) year, (5) project documented experience in the type of Work required by this Project. The cost of each project included in each Bidder's questionnaire must be in excess of $250,000 in order to be considered project experience.

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

Bids shall remain open for a period of 60 days from the date of Bid opening. See Instructions to Bidders for other provisions on the time available for acceptance of Bids.

Each Bid must be accompanied by Bid security in the form of a certified check, bank check, irrevocable letter of credit, or Bid bond (on the form included with the Bidding Documents) for five percent (5%) of the Bid total.

The **CITY OF ABERDEEN** hereby reserves the right, which is understood and agreed to by all Bidders, to reject any or all Bids and to waive any omissions, errors, or irregularities in any Bid.

CITY OF ABERDEEN

SHAWN BROGAN, PROCUREMENT OFFICER

DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

Article 1 - Defined Terms

1.01 Terms used in these *Instructions to Bidders,* which are defined in the Standard General Conditions of the Construction Contract, as prepared by the Engineer's Joint Contract Documents Committee (Document EJCDC C – 700, 2007 Edition), have the meanings assigned to them in the General Conditions. Additional terms used in these *Instructions to Bidders* have meanings indicated below, which are applicable to both the singular and plural thereof.

A. Issuing Office – The office from which the Bidding Documents are to be issued and made available for sale, and where the bidding procedures are to be administered.

1. Issuing Office is the office of the Owner whose name, address and phone number are listed in the Invitation to Bid.

B. Successful Bidder – The lowest, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

Article 2 - Copies of Bidding Documents

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Invitation to Bid may only be obtained from the Issuing Office.

2.02 Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Engineer assume responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, or Bidding Documents purchased from sources other than the issuing office.

2.03 Bids from prospective Bidders who have not obtained the Bidding Documents from the issuing office and who have not obtained complete sets of Bidding Documents will not be accepted.

2.04 Copies of Bidding Documents are made available on the above terms only for the purpose of obtaining Bids on the Work and not to confer a license or grant for any other use.

2.05 Digitizing and posting Bidding Documents on the Internet or on websites of prospective Bidders and other parties, or reproduction of Bidding Documents by others, is not permitted without Engineer’s approval.

Article 3 - Qualifications of Bidders

3.01 To demonstrate qualifications to perform the Work, Bidder shall submit with the Bid the qualification data indicated in the Invitation to Bid, the following Paragraph(s) of Article 3, and

the Bid Form. Bidders shall also be prepared to submit, within five calendar days after the Bid opening date, upon Owner's request, such additional data as may be pertinent to the Project.

3.02 The Bid of out-of-State Bidders and their Sub-bidder(s), if any, shall contain evidence of qualification to do business in the State where the Project is located or covenant to obtain such qualification prior to and as a condition of award of a Contract.

A Bidders are required, under the Business Regulation Article, Section 17-602, Annotated Code of Maryland, to show evidence of Certificate of Registration before award of Contract.

B A copy of current License to operate in the State of Maryland will be required at the time of awarding the Contract.

3.03 To obtain information concerning qualifications of a Bidder, the Owner requires that a completed Experience Questionnaire be submitted on the form included in the Bidding Documents. Bidder shall include the completed Experience Questionnaire with the Bid.

3.04 Submission of financial information is not required with the Bid, but the Owner reserves the right to request such information as part of the Bid evaluation process.

3.05 Failure, or refusal, to submit documentation required by the Invitation to Bid, this Article 3, and the Bid Form will be reason for rejection of the Bid. Following are additional reasons for rejection of the Bid:

A. Failure to submit the Bid and other Bidding Documents, on the forms included in the Project Manual.

B. Failure to sign the Bid Form or any of the required affidavits and other documents attached to it.

C. Failure to furnish the required Bid Security.

D. Failure to include a unit/lump sum price for each item on the Bid Form, including Alternates.

E. The inclusion by Bidder of conditions or qualifications not provided for in the Bidding Requirements and Bidding Documents.

F. Submission of incomplete Bid Form or other required documents.

G. If the Bid Form contains any omissions, erasures, alterations, additions not called for, or irregularities of any other kind.

H. If any bid prices are obviously unbalanced.

I. Non-attendance at a mandatory pre-bid meeting and if applicable, site visit.

Article 4 - Examination of Contract Documents and Site

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

A. To examine thoroughly the Bidding Documents;

B. To visit the site and become familiar with and satisfy Bidder as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work;

C. To consider federal, state, and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

D. To study and carefully correlate Bidder's knowledge and observations with the Bidding Documents and such other related data; and

E. To promptly notify Engineer of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Bidding Documents.

F. Obtain such additional or supplementary examinations, investigations, explorations, tests studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

1. Bidder shall be responsible for restoration of areas disturbed due to supplementary examinations, investigations, explorations, and tests concerning existing aboveground and underground conditions at, or contiguous to the Site.

4.02 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer is acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.03 The provisions of this Article 4 do not apply to Hazardous Environmental Conditions at the site; provisions concerning these conditions appear in Article 4, Paragraph 4.06 of the General Conditions.

Article 5 - Availability of Lands for Work

5.01 The lands upon which the Work is to be performed, rights-of-way and easements for temporary or permanent access thereto and other lands designated for use by Contractor in performing the Work are identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents.

Article 6 - Interpretations and Addenda

6.01 All questions about the meaning or intent of the Bidding Documents shall be directed in written form, by fax or e-mail, to the Engineer. Interpretations, or clarifications, considered necessary by Engineer in response to such questions, will be issued by Addenda, mailed, e-mailed, or faxed to all parties recorded by Engineer as having purchased the Bidding Documents and, if applicable, been present at the pre-bid meeting and site visit. Questions received later than the deadline indicated on the Invitation to Bid, may not be answered. Only questions answered by formal written Addenda will be binding. Oral statements, interpretations, or clarifications will not be binding, or legally effective.

6.02 Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner or Engineer.

Article 7 - Bid Security

7.01 Each Bid must be accompanied by Bid security made payable to Owner in an amount of five (5) percent of Bidder's maximum Bid price and in the form of a certified or bank check, an irrevocable letter of credit, or a Bid Bond (on form attached) issued by a surety meeting the requirements of General Conditions Paragraphs 5.01, 5.02, and 5.03.

A. All instruments of Bid security shall be valid and remain in effect for the entire period that the Bids remain open.

B. Substitute Bid Bond forms are not acceptable.

7.02 The Bid security of the Successful Bidder will be retained until Bidder has executed the Agreement and furnished the required Performance and Payment Bonds, and Insurance Certificate.

7.03 Owner may annul the Notice of Intent to Award, if the apparent Successful Bidder fails or refuses to execute and deliver to the Owner the Agreement, together with the required Performance and Payment Bonds or other forms of security, and Insurance Certificate, within the number of calendar days specified in the Notice of Intent to Award. Bidder shall be considered in Default, and the full amount of its Bid Security shall be forfeited.

7.04 The Owner will return the Bid security and financial information, if any, of all Bidders, except the three apparent lowest responsible, responsive Bidders, within 30 calendar days after the date of Bid opening. The Bid security and financial information, if any, of the Contractor and the remaining two lowest Bidders will be returned upon execution of the Agreement by the Owner.

Article 8 - Contract Time

8.01 The number of calendar days within which, or the date by which, the Work is to be substantially completed (the Contract Time) are set forth in the Agreement.

Article 9 - Liquidated and Other Damages

9.01 Provisions for liquidated and other damages, if any, are set forth in the Agreement.

Article 10 - Substitutions and "Or Equal" Items

10.01 Bids shall be based on Products and methods covered in the Specifications and shown on the Drawings. When a Product specification includes the name or names of manufacturer(s), Bids shall be based on a Product which: (1) meets all Specification requirements; and (2) is produced by one of the manufacturers specifically named in the Specifications for that particular Product.

10.02 Requests for substitutions, "or Equal" for Products or methods other than those specified in the Project Manual, will not be considered prior to the Bid opening date. Refer to Supplementary Conditions Paragraph SC-6.05 for procedures to be used in making, and costs to Contractor associated with, such requests after award of the Contract.

Article 11 - Subcontractors

11.01 Article 6, Paragraph 6.06.B of the General Conditions, as amended by Paragraph SC-6.06.B.1 of the Supplementary Conditions, sets forth requirements as to the approval of Subcontractors, if any.

Article 12 - Bid Form

12.01 The Bid Form and other required Bidding Documents are contained within the Project Manual. Bids must be submitted on forms bound in these documents, or on duplicates provided by the Engineer; substitute Documents are not acceptable. If the forms bound within the Project Manual are used for the originals, they must be removed from the Project Manual for enclosing in the Bid envelope.

A. All blank spaces for Bid prices must be completed in ink or by typewriter and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. The Bid price of each item on the Bid Form must be stated in numerals and in words. Subject to the Owner's right to correct a Bidder's

mathematical totals, a discrepancy between the word and numeral for a particular item will be resolved in favor of the word; corrections to the mathematical totals shall be signed and dated by the person making the correction. When Owner corrects mathematical errors, it shall strike the wrong total with a RED line, so that the original total remains visible.

12.02 The Bid of an individual must be signed by the individual personally; the individual's signature must be witnessed; and the individual's business address and any business trade name must be stated. The Bid of a partnership must state the names and addresses of all partners, and the partnership business name and address; and it must be signed by all general partners, with the signatures witnessed. The Bid of a corporation must show the State of incorporation and the principal office address, and must be signed by the President or Vice President, with the corporate seal affixed, attested by the Secretary or Assistant Secretary.

12.03 All names must be typed or printed below the signature.

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

12.05 The address, e-mail, telephone number, and fax number of Bidder, and the name, e-mail, and telephone number of the individual to whom communications regarding the Bid are to be directed, must be shown.

12.06 The Bid Form may call for lump sum prices, unit prices, or a combination of both.

A. If the Bid form calls for lump sum prices, the Bidder shall state a single lump sum price for the entire Work, or single lump sum prices for each portion of the Work, subject to a lump sum price as set forth in the Bid form, as applicable. Any such lump sum price or prices shall include all the work described in the Contract Documents as being part of the Work.

B. If the Bid Form calls for unit prices, the Bidder shall state a single unit price for each item to be furnished or work to be done as set forth in the Bid Form. The Bid Form indicates, opposite each item for which a unit price is required, the Engineer's estimated quantity of units of such items which will be required in the prosecution of the Work; and the Bidder shall state in the space provided in the Bid Form the total price for such items, as computed by multiplying such estimated quantity of units of such item by the unit price bid.

12.07 Bid prices shall be all inclusive and shall include, if applicable, all taxes of whatever nature applicable to the Work.

12.08 Owner may be exempt from sales and use taxes for certain items to be incorporated into the Work. Each Bidder shall obtain legal advice to determine how and to what extent the Contractor may utilize the Owner’s tax exemption. Owner will provide, at the Contractor's request, documentation required to obtain applicable tax exemptions.

12.09 Submission of prices for all Alternates, if any, is mandatory.

Article 13 - Submission of Bids

13.01 Bids shall be submitted no later than the date and time, and at the place indicated in the Invitation to Bid, and shall be enclosed in an opaque sealed envelope, marked with the Project title (and, when applicable, the designated construction contract for which the Bid is submitted), the name and address of the Bidder, and accompanied by the Bid security and other required documents. If submission of financial information is required with the Bid, seal documents within a separate envelope (bearing the Bidder's name), marked "FINANCIAL INFORMATION - CONFIDENTIAL", and enclose within the Bid envelope. If the Bid is sent through the mail or other delivery system, the sealed Bid envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face of it. **Bids submitted by means of telegraph, e-mail or facsimile machine will not be accepted.**

13.02 Documents to be submitted along with the Bid are specified on the Bid Form. Use loose forms included with the Project Manual or duplicate copies provided by the Engineer. If the forms bound within the Project Manual are used, the forms must be removed from the documents for enclosing in the Bid envelope.

13.03 The Bidder is solely responsible for delivering the Bid to the Owner at the location, and by the time of the Bid opening, designated in the Invitation to Bid. Owner, or Owner's authorized representative, will be available for the purpose of receiving Bids, at said location, immediately prior to the designated time of the Bid opening. No officer, employee, or agent of the Owner is authorized to accept receipt of a Bid on behalf of the Owner at any other time or place and the Owner shall have no responsibility for the receipt of mailed Bids or Bids delivered otherwise than to the Bid opening location as mentioned previously.

Article 14 - Modification and Withdrawal of Bids

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

14.02 After the Bid opening, Bidder may withdraw its Bid, without forfeiture of Bid security, if Bidder submits credible evidence that there is an error in its Bid and such error was a clerical mistake as opposed to a judgement mistake and was due to an unintentional arithmetical error or an unintentional omission of a substantial quantity of the Work; provided: (1) notice of claim of the right to withdraw Bid is made in writing to the Owner within two business days after opening of Bids; and (2) the withdrawal of the Bid will not result in the awarding of the Contract on another Bid of the same Bidder, Bidder's partner, or a corporation, or business venture owned by Bidder, or in which Bidder has a substantial interest. A Bidder which is permitted to withdraw a Bid shall not supply any Products or labor to, or perform any subcontract, or other work, for any entity awarded a Contract, or subcontract for performance of the Work for which the withdrawn Bid was submitted.

Article 15 - Opening of Bids

15.01 Bids will be opened and (unless obviously non-responsive) read aloud publicly at the time and place set forth in the Request for Proposal.

15.02 An abstract of the amounts of Base Bids and major Alternates (if any) will be made available to Bidders after the opening of Bids.

Article 16 - Bids to Remain Subject to Acceptance

16.01 Bids shall remain open for a period of 60 days from the date of Bid opening unless award is delayed by a required approval from a governmental agency, the sale of bonds, or the award of a grant or grants, in which event the Bids shall remain open for a period of 120 days from the date of Bid opening. The Owner will either award the Contract within the applicable time period or reject all Bids, returning the Bid security to the Bidders. Thirty-day extensions of the date for the award may be made by the mutual written consent of the Owner and the apparent Successful Bidder.

Article 17 - Award of Contract

17.01 Owner reserves the right, without limitation, to reject any or all Bids, which are nonconforming, nonresponsive, unbalanced or conditional, and to reject the Bid of any Bidder, if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by Owner. Owner also reserves the right to waive all irregularities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

17.02 The Owner will correct discrepancies in Bidder's mathematical totals. Discrepancies in 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. Discrepancies between words and figures will be resolved in favor of the words.

17.03 In evaluating Bids, Owner will consider the qualifications of Bidders, whether or not the Bids comply with the prescribed requirements, and such Alternates, unit prices, and other data, as may be listed on the Bid Form, or as may be requested by Owner prior to the Notice of Intent to Award.

17.04 In evaluating Bids Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work of which Owner, prior to Notice of Intent to Award, requests their identity. Owner also may consider, where applicable, the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data are required to be submitted prior to the Notice of Intent to Award.

17.05 In evaluating Bids Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

17.06 If the Contract is to be awarded, it will be awarded to the lowest responsible, responsive Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project.

17.07 If the Contract is to be awarded, Owner will give the apparent Successful Bidder a Notice of Intent to Award within the time limits prescribed in Article 16.

17.08 Bidders may be required by Owner, prior to and as a condition of Contract award, to execute and sign documents related to financing of the Project.

17.09 More than one bid from an individual, partnership, corporation, or an association under the same name or different names will not be considered. Reasonable grounds for believing that the Bidder is interested in more than one Bid for the same Work will cause the rejection of all Bids in which such Bidder is interested. Any or all Bids will be rejected if there is any reason for believing that collusion exists among any of the Bidders; participants in such collusion will not be considered in future bidding.

Article 18 - Contract Bonds and Insurance

18.01 Article 5 of the General Conditions sets forth Owner's requirements as to performance and payment bonds and insurance to be provided by the Contractor. When the apparent Successful Bidder delivers the signed Agreement to Owner, it must be accompanied by the required Performance and Payment Bonds or Letters of Credit on the forms provided in the Bidding Documents. **Substitute forms are not acceptable.**

18.02 Article 5 of the General Conditions and the Supplementary Conditions set forth Owner's requirements as to insurance to be carried by the Contractor. When the apparent Successful Bidder delivers the signed Agreement to the Owner, it must be accompanied by the required insurance certificate on the latest version of the Acord 25 Certificate of Insurance form. All policies of insurance shown on the Certificate of Insurance shall not be cancelled or materially changed until thirty days prior notice has been given by Contractor to Owner and Engineer and to each additional insured, and shall contain waiver provisions in accordance with General Conditions, Paragraph 5.07.

Article 19 - Signing of Agreement

19.01 When Owner gives a Notice of Intent to Award to the apparent Successful Bidder, it will be accompanied by four unsigned counterparts each of the Agreement (each with a copy of the Bid submission and, if applicable, the List of Proposed Subcontractors attached), Performance and Payment Bonds, or other forms of financial security. Apparent Successful Bidder shall sign and deliver to the Owner, within the calendar days specified in the Notice of Intent to Award, all

counterparts of the Agreement accompanied by the executed Performance and Payment Bonds (with a Power-of-Attorney certificate attached to each), or other forms of financial security and four originals of the required insurance certificate(s).

A. Successful Bidder(s)/Contractor(s) shall be responsible for all costs resulting from reviewing by Engineer, or others, of non-conforming, or incomplete Contract Document submissions prior to execution of an Agreement. Costs shall be deducted by Change Order from Contractor's first Application for Payment.

19.0 If the Owner finds the documents submitted by the apparent Successful Bidder acceptable, it will, within ten calendar days after receipt of such documents, complete the signing of the Agreement and submit two fully executed counterparts and accompanying documents to the Contractor.

19.03 If the Owner elects to issue a Notice to Proceed, such notice will accompany the fully executed copies of the Agreement. If a Notice to Proceed is not issued, the Contract Times will commence to run as specified in General Conditions, Paragraph 2.03, as amended by Supplementary Conditions Paragraph SC-2.03.A.

19.04 Owner may annul the Contract, if the apparent Successful Bidder fails or refuses to execute and deliver to the Owner the Agreement, together with the required Performance and Payment Bonds or Letters of Credit, and Insurance Certificate, within the number of calendar days specified in the Notice of Intent to Award; Bidder shall be considered in Default, and the full amount of its Bid Bond shall be forfeited.

Article 20 - Pre-Bid Meeting and Site Visit

20.01 A pre-bid meeting and site visit will be held at the time and place set forth in the Invitation to Bid. Engineer will transmit to all prospective Bidders present at the pre-bid meeting and site visit such Addenda, as Engineer considers necessary in response to questions arising at the meeting. Attendance at the pre-bid meeting and site visit is **mandatory.** Bids from parties not present at the meeting and site visit will not be accepted**.**

Article 21 – **Regulatory Requirements**

21.01 MARYLAND CERTIFICATE OF REGISTRATION: Bidders are required, under the Business Regulation Article, Section 17-602, Annotated Code of Maryland, to show evidence of Certificate of Registration before award of Contract. A copy of current License to operate in the State of Maryland will be required at the time of awarding the Contract.

21.02 STEEL PRODUCTS PROCUREMENT ACT: In accordance with the State Finance and Procurement Article, Section 17-303, Annotated Code of Maryland, every public agency shall require that every contract document for the construction, reconstruction, alteration, repair, improvement or maintenance of Public Works contain a provision that, if any steel products are to be used or supplied in the performance of the contract, only steel products as herein defined shall be used or supplied in the performance of the contract or any subcontract thereunder.

A. "Public Works" are defined as any structure, building, highway, waterway, street, bridge, transit system, airport, or other betterment, work or improvement whether of a permanent or temporary nature and whether for governmental or proprietary use.

B Steel products are defined as products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more of such operations, from steel made in the United States by the open-hearth, basic hearth, basic oxygen, electric furnace, Bessemer or other steel making process.

C United States is defined as the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

END OF INSTRUCTIONS TO BIDDERS

DOCUMENT 00300

BID FORM

BIDDER (Name and Address):

PROJECT IDENTIFICATION: **NORTHEAST TANK ALTITUDE VALVE VAULT CONTRACT NO. 20-___**

CONTRACT IDENTIFICATION: General Construction

THIS BID IS SUBMITTED TO: **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform and furnish all Work as specified or indicated in the Bidding Documents for the Contract Price and within the Contract Time(s) and in accordance with the other terms and conditions of the Bidding Documents.

2. Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for a period of 60 days from the date of Bid opening unless award is delayed by a required approval from a governmental agency, the sale of bonds, or the award of a grant or grants, in which event the Bids shall remain open for a period of 120 days from the date of Bid opening. Thirty-day extensions of the date for the award may be made by the mutual written consent of the Owner and the apparent Successful Bidder. Bidder agrees, if required by Owner prior to and as a condition of Contract award, to execute and sign any documents related to financing of the Project. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Documents within the number of days stated in the Owner's Notice of Intent to Award.

3. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

3.1 Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date	Number

3.2 Bidder has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work;

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

3.4 Bidder has carefully studied all reports of explorations and tests of conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing structures at or contiguous to the site which have been identified in the Supplementary Conditions as provided in Paragraph 4.2.1 of the General Conditions. Bidder acknowledges that such reports and drawings are not Bidding Documents or Contract Documents and may not be complete for Bidder's purposes. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions at or contiguous to the site or otherwise which may affect cost progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price, and other terms and conditions of the Bidding Documents and Contract Documents.

3.5 Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Bidding Documents and Contract Documents.

3.6 Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Bidding Documents and Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents and Contract Documents.

3.7 Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder, and the Bidding Documents and Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

3.8 This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4. Bidder will complete the Work for the following lump sum and unit prices price. Refer to Section 01025 for description of pay items.

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price ($)	Extended Price In Figures ($)
1.	All Work Described in the Drawings and Specifications, at the Northeast Tank Site, for Installation of an Altitude Valve Vault, Complete in Place, but not Including Items 2 and 3.	LS			$_____
2.	Miscellaneous Unclassified Excavation.	CY		$_____	$_____
3.	Miscellaneous Aggregate Backfill.	CY		$_____	$_____

Items 2 and 3 are contingency items; payment will not be approved without Engineer's prior written authorization.

Quantities given above for "Contingency Items" are not guaranteed. Final payment will be based on actual quantities. Any difference between estimated and final quantities, increases in market value of Products and services, or complexity of Work will not be considered reason for increase of unit price. **Extended prices for "Contingency Items" will be included in the total Bid Price used to evaluate Bids, but will <u>not</u> be included in the initial Contract Price**.

Total of Items 1 through 3 BID PRICE (Figures): _____

Total of Items 1 through 3 BID PRICE (Words): _____

---

5. Bidder agrees that the Work will be substantially complete on or before the dates or within the number of calendar days indicated in the Agreement.

   Bidder accepts the provisions of the Agreement as to liquidated and other damages in the event of failure to complete the Work on time.

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

   6.1 Required Bid Security in the form of_____.

   6.2 Experience Questionnaire; Document 00400.

   6.3 List of Proposed Subcontractors; Document 00450.

   6.4 Maryland Certificate of Registration may be submitted with the Bid, or prior to and as a condition of award of the Contract.

7. Communications concerning this Bid will be addressed to (Bidder's Contact Person):

_____

Phone: ( ) _____

Fax: ( ) _____

Company Email Address: _____

8. The terms used in this Bid are defined and have the meanings assigned to them in the General Conditions, as may be amended by the Supplementary Conditions, included as part of the Bidding Documents.

9. Bidder acknowledges that the Bid Price is based on Products and methods described and named in the Drawings and Specifications.

10. Bidder certifies that (s)he visited the site on_____, _____, 2020.

INTENDING TO BE LEGALLY BOUND, the undersigned submits the forgoing Bid this _____ day of _____, 2020.

(If Bidder is an Individual)

_____ _____

Signature of Witness Signature of Individual

Trading and doing business as:

_____

Name of Business

_____

Address of Business

(If Bidder is a Limited Liability Company – All Members Must Sign)

Name of Company

Address of Company

Signature of Witness	Signature of Member
Signature of Witness	Signature of Member
Signature of Witness	Signature of Member

(If Bidder is a Partnership - All General Partners Must Sign)

Name of Partnership

Address of Partnership

Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner

(If Bidder is a Corporation)

Attest:

Name of Corporation

Signature of Secretary or
Assistant Secretary

Address of Principal Office

(Corporate Seal)

State of Incorporation

Signature of
President or Vice President

Type or print name below each signature.

State here the names and addresses of all partners, if a partnership, or of three principal officers, if a corporation.

END OF BID FORM

DOCUMENT 00350

BID BOND

BIDDER (Name and Address):

SURETY (Name and Address):

OWNER (Name and Address): **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

PROJECT
Bid Date:
Project Identification: **NORTHEAST TANK ALTITUDE VALVE VAULT**
CONTRACT NO. 20-__

CONTRACT IDENTIFICATION General Construction

BOND
Date:
Amount:

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 full face amount of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents, the executed Agreement required by the Bidding Documents, and any Performance Bonds, Payment Bonds, Certificates of Insurance, or other documents required by the Bidding Documents and Contract Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any Performance Bonds, Payment Bonds, Certificates of Insurance, or other documents required by the Bidding Documents and Contract 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).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt of 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 and any and all defenses based on or arising out of any time extension to issue Notice of Award, provided that the time for issuing Notice of Award shall not in the aggregate exceed 120 days from Bid opening date without Surety's written consent.

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

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

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

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

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

11. The terms used in this Bid Bond which are defined in the General Conditions have the meaning assigned to them in the General Conditions.

(If Bidder is an Individual)

Signature of Witness	Signature of Individual

Trading and doing business as:

Name of Business

Address of Business

(If Bidder is a Limited Liability Company – All Members Must Sign)

Name of Company

Address of Company

Signature of Witness	Signature of Member
Signature of Witness	Signature of Member
Signature of Witness	Signature of Member

(If Bidder is a Partnership - All General Partners Must Sign)

Name of Partnership

Address of Partnership

Signature of Witness — Signature of Partner

Signature of Witness — Signature of Partner

Signature of Witness — Signature of Partner

(If Bidder is a Corporation)

Attest:

Name of Corporation

Signature of Secretary or
Assistant Secretary

Address of Principal Office

(Corporate Seal)

State of Incorporation

Signature of
President or Vice President

Type or print name below each signature.

(Corporation Surety)

Name of Corporation

Address of Office

Signature of Witness

Signature of Attorney-in-fact

Attach an appropriate power of attorney, dated as of the same date as the Bond, evidencing the authority of the Attorney-in-fact to act in behalf of the corporation.

Type or print name below each signature.

NOTE: Substitute Bid Bond Form is not acceptable. Failure to submit Bond on this form will be reason for rejection of Bid.

END OF BID BOND

DOCUMENT 00400

EXPERIENCE QUESTIONNAIRE

PROJECT IDENTIFICATION: **NORTHEAST TANK ALTITUDE VALVE VAULT**
CONTRACT NO. 20-

CONTRACT IDENTIFICATION: **General Construction**

SUBMITTED TO: **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

BY: _____ (-Corporation
(-Partnership
(-An Individual

PRINCIPAL OFFICE ADDRESS _____

The signer of this questionnaire attests to the truth and accuracy of all statements and of all answers to interrogatories hereinafter made.

1. What type of business is Bidder's company? _____

_____

2. How many years has Bidder's company been performing work as a Contractor, or Subcontractor of the type required for this Project? _____

_____

3. Provide information on all service contracts currently in progress.

Contract Amt.	Type of Work (±)	% Completed	Name and Address of Owner(*)	Engineer/ Architect(*)

(*) Provide name of contact person.

(±)Identify if work was performed as a Contractor or Subcontractor

4. What projects, comparable to this Project, has Bidder's company completed within the past (10) years?

Contract Amt.	Type of Work (±)	When Completed	Name and Address of Owner (*)	Engineer/ Architect (*)

(*) Provide name of contact person.
(±)Identify if work was performed as a Contractor or Subcontractor

5. Has Bidder's company ever defaulted on a contract, or failed to complete a contract? _____

If yes, where and why? _____

6. Has Bidder's company ever been debarred? If yes, when, why and by which agency, or political subdivision?

7. Has the Bidder, or any of the company's executives ever been found guilty of a felony? If yes, when and why?

8. List names, addresses, and phone numbers of individuals, or companies referenced in Item 4, that may be contacted by Owner, or Engineer to obtain references.

9. What is the construction experience of the principal individuals of Bidder's company?

Individual's Name	Present Position or Office	Magnitude and Type of Work	In What Capacity?

STATE OF _____

COUNTY OF _____

_____ being duly sworn deposes and

says that (s)he is _____ of _____
Title Name of Company

and attests that the answers to the foregoing questions and all statements therein are true and correct.

_____
Signature

Sworn to before me this _____ Day of _____, 20 _____

My commission expires

_____ _____
Signature of Notary Public

Type or print name below each signature.

END OF EXPERIENCE QUESTIONNAIRE

DOCUMENT 00450

LIST OF PROPOSED SUBCONTRACTORS

PROJECT IDENTIFICATION : **NORTHEAST TANK ALTITUDE VALVE VAULT**
CONTRACT NO. 20-__

CONTRACT IDENTIFICATION: General Construction

SUBMITTED TO: **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

List proposed subcontracts as required in Instructions to Bidders.

Description of Subcontract	Subcontractor's Name	Subcontractor's Address

_____
Signature

_____
Typed or Printed Name

Date _____

_____
Title

NOTE: This List of Proposed Subcontractors must be submitted with the Bid, and failure to submit will be reason for rejection of the Bid.

END OF LIST OF SUBCONTRACTORS

DOCUMENT 00500

AGREEMENT

This Agreement made and entered into this _____ day of _____, 2020
by and between **CITY OF ABERDEEN**,
hereinafter called the Owner,

and

_____
whose address is _____
City of _____
State of _____, hereinafter called the Contractor,

WITNESSETH, that the parties hereto for the consideration stated do mutually agree as follows:

ARTICLE 1 – SCOPE OF WORK

1.1 The Contractor agrees to furnish all labor, superintendence, materials, necessary equipment, and other utilities and facilities for, perform all work necessary for or incidental to, and perform all other obligations imposed by this Agreement for, the complete Work in connection with **NORTHEAST TANK ALTITUDE VALVE VAULT- CONTRACT NO. 20-__** herein called for, all in strict accordance with the Contract Documents as prepared by ARRO Consulting, Inc., acting as and entitled the Engineer in this Agreement.

1.2 The Contract Documents are defined in the General Conditions. The Contract Documents comprise the entire Agreement between Owner and Contractor and are incorporated in this Agreement and made a part hereof. The Contract Documents may only be amended repealed as described in Paragraph 3.04 of the General Conditions.

1.2.1 In the event of a discrepancy among Contract Documents, the provisions of this Agreement (Document 00500) and the provisions of the Supplementary Conditions (Document 00800) shall take precedence over the Standard General Conditions (Document 00700).

1.3 The Drawings, (S-4527A) for the Work covered under this Agreement consist of the following sheets:

SHT. NO.	SHEET TITLE
1 OF 5	TITLE SHEET
2 OF 5	DRAWING INDEX, ABBREVIATIONS, IDENTIFICATION SYMBOLS & GENERAL NOTES
3 OF 5	SITE PLAN
4 OF 5	PLAN, SECTIONS AND DETAILSS
5 OF 5	ELECTRICAL PLAN AND DETAILS

ARTICLE 2 – CONTRACT TIMES

2.1 The Work shall be substantially completed within _____ calendar days after the date when the Contract Times commence to run as provided in General Conditions Paragraph 2.03.A, as amended by Supplementary Conditions Paragraph SC-2.03.A, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within _____ calendar days after the date when the Contract Times commence to.

2.2 Liquidated Damages. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 2.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner $500.00 for each calendar day that expires after the time specified in Paragraph 2.1 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the time specified in Paragraph 2.1 above for completion and readiness for final payment or any proper extension thereof granted by Owner, Contractor shall pay Owner $500.00 for each calendar day that expires after the time specified in Paragraph 2.1 above for completion and readiness for final payment.

2.3 Additional Damages: In addition to the liquidated damages amount(s) specified above under Paragraph 2.2, Contractor also agrees to reimburse Owner for all administrative, legal, engineering, and construction observation costs associated with Contractor's failure to meet any deadline specified above under Article 2, and all actual damages that may result from Contractor’s defective work.

ARTICLE 3 – CONTRACT PRICE, PAYMENT, AND RETAINAGE

3.1 The Owner shall pay, and the Contractor shall receive and accept as full payment for the performance of the Contractor's obligations hereunder, the price(s) stipulated in the Bid Form hereto attached, subject to additions and deductions as provided, and in the manner as specified in the General Conditions and subject to the retainage provisions set forth below.

3.2 Retainage:

3.2.1 The Owner will withhold (5%) five percent of the amount of approved Applications for Payment until the Work is Substantially Complete.

3.2.2 In addition to retainage, the Owner will withhold from payment otherwise due the Contractor any amount that the Owner reasonably believes necessary to protect its interest.

3.2.3 Except as provided in paragraph 3.2.4 below, within 120 days after Final Completion of the Work, Owner will release any retainage due to the Contractor.

3.2.4 In the event that a dispute arises between the Owner and the Contractor, concerning the satisfactory completion of the Work, the Owner will release the retainage to the contractor within 120 days after the resolution of the dispute or contract claim.

3.2.5 Contractor shall not withhold a percentage of payment due a subcontractor that exceeds the percentage of payment retained by the Owner.

3.2.6 Liquidated and other damages shall be deducted, by Change Order, from money due, or to become due, to the Contractor, evidenced by a current application for payment.

3.3 Final Payment. Upon final completion and acceptance of the Work in accordance with General Conditions Paragraph 14.07, Owner shall pay the remainder of the Contract Price less the amount of liquidated and/or other damages and the amount of any unresolved claims, which have been filed against the Owner in connection with the Work, as recommended by Engineer in accordance with said General Conditions Paragraph 14.07.

3.4 Interest. All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the maximum rate allowed by law in the State where the Project is located.

ARTICLE 4 – CONTRACTOR'S REPRESENTATIONS

In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

4.1 Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

4.2 Contractor has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work.

4.3 Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work.

4.4 Contractor has carefully studied all reports of explorations and tests of conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing structures at or contiguous to the site which have been identified in the Supplementary Conditions as provided in Paragraph SC-4.02 of the Supplementary Conditions. Contractor acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto. Contractor does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

4.5 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.

4.6 Contractor has correlated the information known to Contractor, information and observations obtained from visits to the site, reports, and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

4.7 Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 5 – MISCELLANEOUS

5.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions, as modified by the Supplementary Conditions, will have the meanings indicated in the General Conditions.

5.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and

moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

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

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

5.5 Paragraph SC-6.05.L of the Supplementary Conditions provides for charging the Contractor for costs associated with any request for substitution made by the Contractor.

5.6 Section 01300 of the General Requirements provides for charging the Contractor for costs associated with review of any submittals which are classified as excess re-submittals; that is, any re-submittal beyond the first. Contractor agrees to compensate Owner for such charges by allowing deductions from Contractor's progress payments.

5.7 Contractor agrees to compensate Owner for such charges incurred under Paragraphs 5.5 and 5.6 above.

ARTICLE 6 – DISPUTE RESOLUTION

6.1 Any disputes between parties to the Contract which do not reach amicable settlement shall be tried by a Court of Law in Harford County, Maryland. The Contractor shall carry on the Work and maintain the Progress Schedule, during any disputes unless otherwise directed by the Owner.

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

(If Contractor is an Individual)

Signature of Witness	Signature of Individual

Trading and doing business as:

Name of Business

Address of Business

(If Contractor is a Limited Liability Company – All Members Must Sign)

Name of Company

Address of Company

Signature of Witness	Signature of Member
Signature of Witness	Signature of Member

(If Contractor is a Partnership - All General Partners Must Sign)

Name of Partnership

Address of Partnership

Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner

(If Contractor is a Corporation)

Attest:

Name of Corporation

Signature of Secretary or Assistant Secretary	Address of Principal Office
(Corporate Seal)	State of Incorporation

Signature of
President or Vice President

(Owner)

Attest:

Owner's Organizational Name

Owner’s Address

Signature	Signature
Title	Title

Type or print name below each signature.

END OF AGREEMENT

DOCUMENT 00610

PERFORMANCE BOND

CONTRACTOR (Name and Address): SURETY (Name and Address):

OWNER (Name and Address): **CITY OF ABERDEEN**
60 North Parke Street
P.O. Box 70
Aberdeen, MD 21001

AGREEMENT
Amount:
Project Identification: **NORTHEAST TANK ALTITUDE VALVE VAULT**
CONTRACT NO. 20-__

CONTRACT IDENTIFICATION General Construction

BOND
Date:
Amount:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the Performance of the Work as defined by the Agreement, which is incorporated herein by reference.

2. If the Contractor performs the Work, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

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

3.1 The Owner has notified the Contractor and the Surety at its address described in Article 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Work. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Work, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor default; and

3.2 The Owner has declared a Contractor default and formally terminated the Contractor's right to complete the Work. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Paragraph 3.1; and

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

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

4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Work; or

4.2 Undertake to perform and complete the Work itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Work, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Work, and pay to the Owner the amount of damages as described in Article 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

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

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

2. Deny liability in whole or in part and notify the Owner citing reasons therefor.

5. If the Surety does not proceed as provided in Article 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen 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 4.4, and the Owner refuses the payment tendered 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.

6. After the Owner has terminated the Contractor's right to complete the Work, and if the Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Agreement, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Agreement. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Work, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for:

1. Completion of the Work, as defined in Article 1 of the General Conditions.

2. Correction of defective work during the one-year Correction Period, as defined in General Conditions' Paragraphs 13.07.A through 13.07.E and as modified by the Supplementary Conditions..

6.2 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 Article 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Agreement, actual damages caused by delayed performance or non-performance of the Contractor.

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

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

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

10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the front page.

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

12. Definitions:

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Agreement after all proper adjustments have been made, including allowance to the Contractor of 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 Agreement.

12.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Agreement.

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

12.4 The terms used in this Performance Bond which are defined in the General Conditions have the meaning assigned to them in the General Conditions.

(If Contractor is an Individual)

Signature of Witness	Signature of Individual

Trading and doing business as:

Name of Business

Address of Business

(If Bidder is a Limited Liability Company – All Members Must Sign)

Name of Company

Address of Company

Signature of Witness	Signature of Member
Signature of Witness	Signature of Member
Signature of Witness	Signature of Member

(If Contractor is a Partnership - All General Partners Must Sign)

Name of Partnership

Address of Partnership

Signature of Witness — Signature of Partner

Signature of Witness — Signature of Partner

Signature of Witness — Signature of Partner

(If Contractor is a Corporation)

ATTEST:

Name of Corporation

Signature of Secretary or
Assistant Secretary

Address of Principal Office

(CORPORATE SEAL)

State of Incorporation

Signature of
President or Vice President

Type or print name below each signature.

(Corporation Surety)

Name of Corporation

Address of Office

Signature of Witness

Signature of Attorney-in-fact

Attach an appropriate power of attorney, dated as of the same date as the Bond, evidencing the authority of the Attorney-in-fact to act in behalf of the corporation.

Type or print name below each signature.

NOTE: Substitute Performance Bond Form is not acceptable. Failure to submit Bond on this form will be reason for rejection of Bid.

END OF PERFORMANCE BOND

DOCUMENT 00620

PAYMENT BOND

CONTRACTOR (Name and Address):	SURETY (Name and Address):
OWNER (Name and Address):	**CITY OF ABERDEEN** 60 North Parke Street P.O. Box 70 Aberdeen, MD 21001
AGREEMENT Amount: Project Identification:	**NORTHEAST TANK ALTITUDE VALVE VAULT** **CONTRACT NO. 20-__**
CONTRACT IDENTIFICATION	General Construction
BOND Date: Amount:	

1. The Contractor and the 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 Work as defined by the Agreement, which is incorporated herein by reference.

2. With respect to the Owner, this obligation shall be null and void if the Contractor:

   2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

   2.2 Defends, indemnifies, and holds harmless the Owner from all claims, demands, liens, or suits by any person or entity who furnished labor, materials, or equipment for use in the performance of the Work, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Article 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Article 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Contractor:

1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Article 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5. If a notice required by Article 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of Article 4, the Surety shall promptly and at the Surety's expense take the following actions.

6.1 Send an answer to the Claimant, with a copy to the Owner, within 60 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

6.3 The Surety’s failure to discharge its obligations under this Section 6 shall not be deemed to constitute a waiver of defenses the Surety or the Contractor may have or acquire as to a claim. However, if the Surety fails to discharge its obligations under this Section 6, the Surety shall indemnify the Claimant for the reasonable attorney’s fees the Claimant incurs to recover any sums found to be due and owing to the Claimant under this Section 6.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the Owner to the Contractor under the Agreement shall be used for the performance of the Work and to satisfy claims, if any, under any 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 Work are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the Work.

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

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

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraphs 4.2.3 or 4.1, 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 Agreement, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

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

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

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

15. Definitions:

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

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

15.3 The terms used in this Payment Bond which are defined in the General Conditions have the same meaning assigned to them in the General Conditions.

(If Contractor is an Individual)

Signature of Witness	Signature of Individual

Trading and doing business as:

Name of Business

Address of Business

(If Bidder is a Limited Liability Company – All Members Must Sign)

Name of Company

Address of Company

Signature of Witness	Signature of Member
Signature of Witness	Signature of Member
Signature of Witness	Signature of Member

(If Contractor is a Partnership - All General Partners Must Sign)

	Name of Partnership
	Address of Partnership
Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner
Signature of Witness	Signature of Partner

(If Contractor is a Corporation)

ATTEST:

	Name of Corporation
Signature of Secretary or Assistant Secretary	Address of Principal Office
(CORPORATE SEAL)	State of Incorporation
	Signature of President or Vice President

Type or print name below each signature.

(Corporation Surety)

Name of Corporation

Address of Office

Signature of Witness

Signature of Attorney-in-fact

Attach an appropriate power of attorney, dated as of the same date as the Bond, evidencing the authority of the Attorney-in-fact to act in behalf of the corporation.

Type or print name below each signature.

NOTE: Substitute Payment Bond Form is not acceptable. Failure to submit Bond on this form will be reason for rejection of Bid.

END OF PAYMENT BOND

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 a Project and the controlling Federal Laws and Regulations and/or Laws and Regulations of the State in which the Project is located. Refer to the Supplementary Conditions for amendments made to this. This document must be used in conjunction with the Supplementary Conditions of the Contract.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

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CONSTRUCTION SPECIFICATIONS INSTITUTE

STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. Agreement—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *BiddingDocuments*—TheBidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other

Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

*34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

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

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

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

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

B. Evidence of Insurance: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary

Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. Preliminary Schedules: Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

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

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

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

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

1. Contractor's Review of Contract Documents Before Starting Work: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. Contractor's Review of Contract Documents During Performance of Work: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of

the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

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

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in

connection therewith (except as aforesaid) until receipt of written order to do so.

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

C. *Possible Price and Times Adjustments:*

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

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data;

b. locating all Underground Facilities shown or indicated in the Contract Documents;

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or

identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

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

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

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

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

    a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

    b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:

    a. Such insurance shall remain in effect for two years after final payment.

    b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or

required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

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

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members,

partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

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

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or

maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

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

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as

it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

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

2. *Substitute Items:*

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of

material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:
   a) perform adequately the functions and achieve the results called for by the general design,
   b) be similar in substance to that specified, and c) be suited to the same use as that specified;
2) will state:
   a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
   b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
   c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
3) will identify:
   a) all variations of the proposed substitute item from that specified, and
   b) available engineering, sales, maintenance, repair, and replacement services; and
4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

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

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including

those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular

invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

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

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when

prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

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

1. *Shop Drawings:*

a. Submit number of copies specified in the General Requirements.

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

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

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

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

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

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

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other

contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

8.12 *Compliance with Safety Program*

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

8.13 *Resident Project Representative*

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12. D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

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

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any

authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and

Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

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

10.05 *Claims*

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 *Cost of the Work*

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

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by

Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

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

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

11.02 *Allowances*

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

B. *Cash Allowances:*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable

trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

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

C. *Contingency Allowance*:

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

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

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

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

    a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

    b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

    c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

    d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

    e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

    f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and

exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an

emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are

unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such

payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

    a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

    b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work, or

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

    d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

    d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

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

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

    a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

    b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

    c. there are other items entitling Owner to a set-off against the amount recommended; or

    d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs

14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner

believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

b. consent of the surety, ~~if any,~~ to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

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

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

C. *Payment Becomes Due:*

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

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established

under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

17.07 *Resident Project Representative Responsibilities and Authority*

DOCUMENT 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings 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 thereto.

SC-1.01.A

Add the following new *Defined Terms* subparagraphs to General Conditions Paragraph 1.01.A:

52. *Consultant* – A person, firm, or corporation having a contract with Owner or Engineer to furnish services as Owner's or Engineer's independent professional associate with respect to the Project and who is identified as such in the Supplementary Conditions.

53. *Emergency* – An occurrence which in the opinion of the Owner, the Owner's Representative, or the Contractor requires immediate attention by the Contractor and for which written notice to the Contractor, or the Owner, due to the urgency of the occurrence, cannot be issued within the time stipulated by the General Conditions.

54. *Imminent Danger* - Any conditions or practices in any place of employment, which are such that a danger exists, which could reasonably be expected to cause death or serious physical harm to a person immediately or before the imminence of such danger can be eliminated.

55. *Mobilization/Demobilization* - This work consists of the mobilization and demobilization of the Contractor's forces and equipment necessary for performing the Work required under the Contract at the time of award. It does not include mobilization and demobilization of Contractor's subcontractors, or for specific items of the Work for which payment is provided elsewhere in the Contract. Mobilization shall not be considered as work in fulfilling the Contract requirements for commencement of the Work.
    a. Mobilization shall include all activities and associated costs for transportation of Contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary facilities for the Contractor's and others' (in case of multiple Contracts) operations at the site.

b. Demobilization shall include all activities and costs for removal and transportation from the site, at completion of the Work, of personnel, equipment and supplies no longer required, or included in the Contract; including the disassembly, removal and site cleanup of offices, buildings, and other facilities assembled on the site specifically for performance of the Work.

56. *Products* – New materials, machinery, components, equipment, fixtures, systems, and any other item which will become or has become a permanent physical portion of the Work. The term "Products" may also include materials, equipment, or components removed from existing facilities that may, if specifically permitted by the Contract Documents, be re-used in the Work. The term "Products" does not include machinery and equipment used for preparation, fabrication, conveying, or erection of the Work.

SC-1.01.A.8

Delete General Conditions Subparagraph 1.01.A.8 in its entirety.

SC-1.01.A.12

Delete General Conditions Paragraph 1.01.A.12 in its entirety and insert the following in its place:

12. *Contract Documents* The Contract Documents, which comprise the entire agreement between OWNER and CONTRACTOR, and which are incorporated in the Agreement by reference, and are made a part of it, consist of the Agreement, together with all written amendments,, Addenda, Contractor's Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Intent to Award), which is attached to the Agreement, Performance, Payment and other required Bonds, the General Conditions, the Supplementary Conditions, any special conditions dictated by a funding or other regulatory agency, the Specifications, the Drawings (which are identified in the Agreement), Notice to Proceed, Change Orders, Work Change Directives, Field Orders and Engineer's written interpretations and clarifications issued pursuant to General Conditions Paragraphs3.04.A, 3.04.B.1 and 3.04.B.3 on or after the Effective Date of the Agreement. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

SC-1.01.A.27

Amend the defined term "Notice of Award" to read "Notice of Intent to Award."

SC-1.01.A.34

Delete General Conditions Subparagraph 1.01.A.34 in its entirety and insert the following in its place:

34. Project Manual – The bound document containing the Invitation to Bid, Instructions to Bidders, Bidding Documents, Contract Documents, General Conditions, Supplementary Conditions, the Specifications (Divisions 1 through 16, as applicable), and any attached supplementary exhibits, appendices, and attachments..

SC-1.01.A.36

Delete General Conditions Subparagraph 1.01.A.36 in its entirety and replace it with the following:

36. Resident Project Representative – A representative of either the Owner or Engineer who may be assigned to the Project site on either a full- or part-time basis. The duties, responsibilities, and limitations on authority of the Resident Project Representative are specified in Supplementary Conditions paragraph SC-17.07.

SC-1.01.A.44

Add the following new subparagraph to General Conditions Subparagraph 1.01.A.44:

a. In no event will the Work be certified as substantially complete until at least 90 percent of Work is completed. Partial utilization of any portion of the Work does not constitute Substantial Completion for that portion. Refer to Section 01700 for additional requirements to be met prior to Engineer issuing a "Definitive Certificate of Substantial Completion".

SC-2.02.A

Delete General Conditions Paragraph 2.02.A in its entirety and insert the following in its place:

A. Owner will furnish to the Contractor (1) complete sets of the Contract Documents and one set in electronic PDF format.

SC-2.03.A

Delete General Conditions Paragraph 2.03.A in its entirety and insert the following in its place:

A. The Contract Times will commence to run on the Effective Date of the Agreement, or if a Notice to Proceed is given on the date indicated on the Notice to Proceed.

SC-2.05.A

Amend General Conditions Paragraph 2.05.A by deleting from the first line the words "…Effective Date of the Agreement…" and replacing them with "…date when the Contract Times commence to run…".

Add the following new subparagraph to General Conditions Paragraph 2.05.A:

4 Preliminary Progress Schedule shall include a time estimate for performing work required by each contingency item, if any, listed in the Bid Form.

SC-2.05.A.3

Add the following new subparagraph to General Conditions subparagraph 2.05.A.3:

a. If, in the opinion of the Engineer, the preliminary Schedule of Values is distorted, and not consistent with industry standards, the Contractor shall provide substantiation of the questioned items in the form of executed subcontracts or Purchase Orders.

SC-2.05.B

Add the following new Paragraph immediately after General Conditions Paragraph 2.05.A:

B. *Insurance Certificates:* Before any Work at the site is started, Contractor shall deliver to Owner, with a copy to Engineer, certificates (and other evidence of insurance requested by Owner) which Contractor is required to purchase and maintain in accordance with General Conditions Paragraph 5.04 and Supplementary Conditions Paragraph SC-5.06.

SC-3.03.B

Add the following new subparagraph to General conditions Paragraph 3.03.B:

2. If there are any conflicts, errors, ambiguities, or discrepancies within the Contract Documents, the documents shall be interpreted in the following order of precedence: (1) Agreement, together with all Written Amendments, (2) Supplementary Conditions, (3) Standard General Conditions, (4) Specifications together with all Written Amendments, Change Orders, Work Orders, Change Directives, Field Orders, and Engineer's written interpretations and clarifications, (5) Drawings as more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Orders, Change Directives, Field Orders and Engineer's written interpretations and clarifications.

SC-4.02

Delete General Conditions Paragraphs 4.02.A and 4.02.B, including their subparagraphs, in their entirety and delete all references to them elsewhere in the Contract Documents.

SC-5.01.B

Add the following new subparagraph to General Conditions Paragraph 5.01.B:

1. The Payment Bond and the Performance Bond, or other instruments of financial security, to be supplied by the Contractor shall be in the forms included in the Contract Documents, and no other forms shall be acceptable.

SC-5.01.D

Add the following new Paragraph immediately after General Conditions Paragraph 5.01.C:

A. *Additional Bonds:* If Contract Price or Contract Time is changed in accordance with General Conditions Article 10, Owner may require that Contractor's bonds and insurance policies be modified to reflect such changes. Any resulting changes in Contractor's bond and insurance costs will be paid for in accordance with General Conditions Paragraph 11.01.A.5.i.

SC-5.03

Delete General Conditions Paragraphs 5.03A and 5.03.B in their entirety and replace with the following:

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain in accordance with General Conditions Paragraph 5.04 and Supplementary Conditions Paragraphs SC-5.04 and SC-5.06.A through SC-5.06.E.

B. Contractor shall submit evidence of required insurance coverage on the most current Accord 25 "Certificate of Insurance" form. All the policies of insurance required to be purchased and maintained by Contractor shall not be cancelled or materially changed until thirty days prior notice has been given by Contractor to Owner and Engineer and to each additional insured, and shall contain waiver provisions in accordance with General Conditions Paragraph 5.07, as amended by Supplementary Conditions Paragraph SC-5.07.A and SC-5.07.B.

SC-5.04.B

Amend General Conditions Subparagraph 5.04.B.1 by inserting the word ”non-contributory” between the words “primary” and “coverage” at the end of the Subparagraph.

SC-5.04

Add the following new Paragraph immediately after General Conditions Paragraph 5.04.B:

C. The limits of liability for the insurance required by General Conditions Paragraphs 5.04.A.1 through 5.04.B.6 inclusive shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers’ Compensation, and related coverages under General Conditions Paragraphs 5.04.A.1 and 5.04.A.2:

a.	State:	Statutory
b.	Applicable Federal:	Statutory
c.	Employer’s Liability:	$1,000,000

2. Contractor’s General Liability under General Conditions Paragraphs 5.04.A.3 through 5.04.A.6, which shall include completed operations and product liability coverage; and eliminate the exclusion with respect to property under the care, custody and control of Contractor(*):

a.	General Aggregate:	$2,000,000
b.	Products – Completed Operations Aggregate:	$1,000,000
c.	Personal and Advertising Injury:	$1,000,000
d.	Each Occurrence (Bodily Injury and Property Damage):	$1,000,000

e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverage’s, where applicable.

f. Blasting hazards, where applicable.

g. Excess or Umbrella Liability: (**)

[X]	General Aggregate:	$2,000,000
[X]	Each Occurrence:	$2,000,000

(*) If Contractor's insurance does not allow eliminating the exclusion with respect to property under its care, custody and control, Contractor shall provide, by endorsement, "Voluntary Property Damage" coverage in the amount of the full replacement cost of the damaged property.

(**) If Contractor has lower underlying coverage than required above under Paragraphs SC-5.04.C.2.a through SC-5.04.C.2.d, Contractor may provide additional coverage to at least satisfy the required amount.

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

   a. Bodily Injury and Property Damage, Combined Single Limit of: $1,000,000

4. The Contractual Liability coverage required by General Conditions Paragraph 5.04.B.3 shall provide coverage for not less than the following amounts:

   a. Bodily Injury and Property Damage (Each Occurrence): $1,000,000

5. Additional Insured*:*

   a. City of Aberdeen.

   b. ARRO Consulting Inc.

Contractor shall be responsible for any deductible, or self-insured retention.

SC-5.05.A

Delete General Conditions Paragraph 5.05.A in its entirety.

SC-5.06

Delete General Conditions Paragraphs 5.06.A through 5.06.E, including their subparagraphs, in their entirety.

SC-5.07.A

Amend General Conditions Paragraph 5.07.A by inserting the words ”and non-contributory” immediately after the word “primary” at the end of the ninth line.

Add the following new Subparagraph to General Conditions Paragraph 5.07.A:

1. Notwithstanding the provisions of Paragraph 5.07.A, any waiver of rights by the Owner shall be effective only to the extent of actual recovery of insurance proceeds.

SC-5.07.B

Add the following new Subparagraph to General Conditions Paragraph 5.07.B:

3. Notwithstanding the provisions of Paragraph 5.07.B and its Subparagraphs, any waiver of rights as contemplated shall be effective only if such waiver is permitted by Owner's policies.

SC-5.08

Delete General Conditions Paragraph 5.08, including its subparagraphs, in its entirety.

SC-6.02.B

Add the following new subparagraphs to General Conditions Paragraph 6.02.B:

1. Regular working hours for the Project are defined as 7:00 AM. to 5:00 PM Monday through Friday.

2. If Owner consents to Contractor working during non-regular hours or on Saturday, Sunday, or any legal holiday, Contractor shall reimburse Owner for wages, salaries, and expenses paid to Owner’s and Engineer’s personnel which, in the Owner’s judgment, are required to be present at the Project site during the Contractor’s Work. Contractor’s reimbursement to Owner for these extra personnel costs will be in the form of deduction from a progress payment. Contractor’s superintendent shall also be present during performance of Work during non-regular hours, or on Saturday, Sunday, or any legal holiday.

SC-6.05

Delete General Conditions Paragraphs 6.05.A through 6.05.F in their entirety and insert the following new Paragraphs 6.05.A through 6.05.L in their place:

A. “Or-Equal”: If in Engineer’s sole discretion a Product proposed by Contractor is functionally the same, is fully equivalent in quality and durability, and is

sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed Product may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements, specified in the following Paragraphs 6.05.C. through 6.05.J., for acceptance of proposed substitute items.

B. Substitute Items: If in Engineer's sole discretion a Product proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A. above, it will be considered a proposed substitute item. The determination as to whether the Product is an "or-equal" or a proposed substitute item will be made during Engineer's review of the Product Shop Drawing, as defined in Article 1 of the General Conditions. If the Product proposed by the Contractor is not considered an "or-equal" Product, the Shop Drawing will be returned to the Contractor with the notation "Returned for Correction". Contractor will then be required to proceed as specified in the following Paragraphs 6.05.C through 6.05.J.

C. Submit three copies of request for substitution, plus the number required to be returned to the entity making the request, to the Engineer. Each request for substitution shall cover one Product only.

D. Requests for Equal or substitutions will be accepted only from a prime Contractor on the Project and, if requests are permitted during the Bidding period, from a Bidder as defined in the Instructions to Bidders.

E. If Instructions to Bidders allow requests for Equal or substitutions during the Bidding period, time the submittal so that Engineer receives request for at least 18 days prior to the Bid opening date.

F. Submit, with request for substitution, Shop Drawings, Product data, warranty information, case histories, lists of projects on which the Product has been successfully used, test reports, manufacturer's company profile, name and address of manufacturer's service organization, and other data as required to establish that proposed substitute Product is fully equivalent in quality to the Product of the named manufacturer(s) and meets all Specification requirements.

G. Submit, with request for Equal or substitution, the dollar amount which the Owner will receive as a credit toward the Contract Price if the Equal or substitution is approved. The Owner and Engineer reserve the right to make an independent investigation of the cost savings, to negotiate with the Contractor to increase the credit, and to reject a proposed Equal or substitution if the credit is considered insufficient.

H. Attach letters, provided by other contractors whose work may be affected by the proposed substitution, stating that the substitution will either have no effect on their work or that the substitution will affect their work and that the entity making the request for substitution has agreed to pay any extra costs which may be incurred if

the substitution is approved. (This requirement does not apply during the Bidding period.)

I. The entity submitting the request for Equal or substitution shall include, on its transmittal letter, the signed statement: "The signer of this letter certifies that all requirements of Supplementary Conditions Paragraph SC-6.05.I have been or will be met". The signer of the transmittal letter, by making this statement, affirms that: the proposed substitute Product has been investigated and has been found to equal or exceed in quality and durability the Product of the named manufacturer(s) and, further, that it meets all Specification requirements; all other prime contractors on the Project have been contacted as to the effect of the proposed substitution on their work and that letters from all other prime contractors are being submitted with the request (this condition does not apply during the Bidding period); the same Product warranty, which would have been provided by the named manufacturer(s), will be provided for the substitute Product; the entity submitting the request for substitution will coordinate installation of the proposed substitute and make any required changes in the Work at no additional cost to the Owner; the entity submitting the request for substitution will not make claims for additional costs, including but not limited to costs resulting from increases in purchase price(s) and installation costs of accepted substitute Product(s), or additional time required to implement the substitution; the entity making the request for substitution will reimburse the Owner for all costs associated with review by Engineer, or others, of the request for substitution, all redesign costs, and all costs required to obtain re-approval from regulatory agencies; all licenses required for use of the proposed substitute Product will be obtained and paid for by the entity submitting the request for substitution and such license(s) will be transferred to the Owner; if required by the Engineer, the entity submitting the request for substitution will provide a special performance warranty or bond (separate from the Contract Performance Bond) as a condition of Engineer's acceptance of the proposed substitute Product (such bond may be in an amount up to 200 percent of the dollar value of the Product as determined by the Engineer).

J. Engineer will notify the entity submitting the request, in writing, of decision to accept or reject proposed substitute Product.

K. The procedures for proposed substitute means, methods, techniques, sequences, or procedures shall be equivalent to those specified above in Paragraphs 6.05.A. through 6.05.J.

L. Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability, and no substitute will be ordered, installed, or utilized without Engineer's prior written approval. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitutions, making any required revisions to Contract Documents, and obtaining re-approval from regulatory agencies. Contractor will be charged for the recorded man-hours, whether or not substitution is approved, at Engineer's and Engineer's

Consultant's current hourly rates. Charges shall be subtracted from the Contractor's next progress payment.

SC-6.06.B

Add the following new subparagraph to General Conditions Paragraph 6.06B:

1. Instructions to Bidders and these Supplementary Conditions require that a list of proposed Subcontractors be submitted with the Bid. Contractor shall not make substitutions of Subcontractors shown on the list, or additions of Subcontractors, after award of a Contract, without prior written approval of Owner or Engineer. Engineer will be allowed a reasonable time within which to investigate each proposed substitute or new Subcontractor. Engineer will be the sole judge of acceptability, and no substitute/new Subcontractor will perform any portion of the Work without Engineer's prior written approval. Engineer will record time required by Engineer in investigating the proposed substitute/new Subcontractor(s). Contractor shall be charged for the recorded man-hours, whether or not substitution is approved, at Engineer's current hourly rates. Charges will be subtracted from the Contractor's next progress payment.

SC-6.06.G

Add the following new sub-paragraph to General Conditions Paragraph 6.06.G:

1. If a written agreement between the Contractor and a Subcontractor or supplier is not obtained, Contractor, Subcontractor or supplier will not be entitled to payment for any additional Work performed or changes to Work performed by Subcontractor or Supplier.

SC-6.08.B

Add the following new Paragraph immediately after General Conditions Paragraph 6.08.A:

B. Owner has made application, and has paid or will pay required fees, for the permits and approvals listed below:

    1. All permits and approvals required from Maryland Department of the Environment.

    2. Approval of sediment and erosion control plan from Harford County.

SC-6.09.A

Add the following new subparagraph(s) to General Conditions Paragraph 6.09.A:

1. The Contractor is subject to **MISS UTILITY**: Sections 12-101, *et seq*., of the Public Utility Companies Article of the Maryland Annotated Code, as amended from time to

time, which establish requirements regarding protection of existing underground utilities from excavation and demolition activities.

SC-6.10.A

Delete General Conditions Paragraph 6.10.A in its entirety and insert the following in its place:

A. The Contractor shall be responsible for the payment of all sales and use taxes required by law on all Products which may be purchased for use in and which will become part of the Work. Owner may be exempt from sales and use taxes for certain Products to be incorporated into the Work. Contractor shall obtain legal advice to determine how and to what extent the Owner's tax exemption may be utilized by the Contractor. Owner will provide, at Contractor's request, required documentation to assist Contractor in obtaining any applicable tax exemptions.

SC-6.11.A

Add the following new subparagraph immediately after General Conditions subparagraph 6.11.A.3:

4. Contractor’s responsibility shall include repairing, replacing, or restoring damaged property to its original or better condition, or the payment of money in a sum equal to the reasonable value of the damage caused to such property. If Contractor fails to promptly repair or replace damaged property, Owner may have the work performed by others and the cost of such work shall be deducted from Contractor’s subsequent progress payment.

SC-6.11.D

Add the following new subparagraphs to General Conditions Paragraph 6.11.D:

1. The Contractor shall determine the legal dimensional and load limits on all roads and bridges over and under which equipment and materials will be moved. In the event that loads or dimensions exceed legal limits, the Contractor shall obtain the necessary permits, pay permit fees, and comply with all regulations for moving such loads.

.2. Contractor shall be responsible for damages to structures, roads and bridges resulting from loads or dimensions exceeding legal or design limits.

SC-6.16

Add the following new Paragraphs immediately after General Conditions Paragraph 6.16.A:

B. The Contractor shall provide during non-working hours a maintenance crew to correct conditions, which are hazardous to the public or detrimental to proper

system operation. If the Contractor refuses, or fails to correct the problem within a reasonable period of time, the Owner will have the necessary corrections performed by others and the full cost of the work shall be deducted from Contractor's subsequent Application for Payment. Names, addresses, and telephone numbers of the Contractor's emergency repair personnel shall be submitted to the Owner and Engineer at the pre-construction conference.

C. In the event of an emergency if Contractor refuses, or fails to respond to Owner's directive to make necessary corrections Owner may stop work immediately, and without seven days' written notice as required by General Conditions Paragraph 15.02.

SC-6.19.C

Add the following new subparagraph immediately after General Conditions subparagraph 6.19.C.7:

8. any contract between Owner and subcontractor regarding the correction of defective work.

SC-6.20.C

Delete General Conditions Paragraph 6.20.C in its entirety. Including its subparagraphs, and insert the following in its place:

C. The indemnification obligations of the Contractor under Paragraph 6.20.A shall not extend to the liability of the Engineer, Engineer's Consultants, agents, officers, directors, or employees arising out of errors or omissions of any of them in the preparation of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or the giving or failure to give directions or instructions, relating to design of the Work, as opposed to Project Construction procedures, by the Engineer, its agents or employees, if such giving or failure to give is the primary cause of the injury or damage.

SC-8.06

Delete General Conditions Paragraph 8.06 in its entirety.

SC-9.03.A

Delete General Conditions Paragraph 9.03.A in its entirety and insert the following in its place:

A. Engineer will assign a Resident Project Representative to the Project site. The responsibilities and authority of the Resident Project Representative, and their limitations, will be as provided in Supplementary Conditions Paragraph SC-17.07

SC-9.09.A

Add the following new subparagraphs under General Conditions Paragraph 9.09.A:

1. The Engineer will give the Contractor all desired assistance in interpreting specifications, drawings, or written instructions. Such assistance or lack thereof shall not relieve the Contractor from its responsibility to perform the Work in accordance with the Contract Documents.

2. The fact that the Engineer has permitted faulty work, or work to be performed not in accordance with the Contract Documents will not prevent the Engineer or Owner from requiring that the Contractor corrects any faults or incorrect construction immediately at no additional cost to the Owner.

3. The Engineer may not enter into any agreement with a Subcontractor which binds the Owner to make payments for work performed by the Subcontractor absent express written permission by the Owner for the specific work and Subcontractor involved.

SC-10.01.C

Add the following new Paragraph immediately after General Conditions Paragraph 10.01.B.

C. When submitting a Change Order request, the Contractor shall provide such information as the Engineer and Resident Project Representative may require for the preparation of the Change Order in accordance with the General Conditions. Such information may include, but not be limited to, the following:

   1. Itemized description of the addition, deletion, or revision to the Work.
   2. Itemized description of the change in the Contract Price, including itemized contractor's /subcontractor's labor costs and materials pricing data to enable determination of the necessity and reasonableness of the costs. For work performed by subcontractor(s), documentation may require submittal of actual invoices.
   3. Description of the change, if any, in the Contract Time. The Contractor shall submit adequate documentation to satisfactorily prove that the nature of the delay actually and unavoidably will impact the Contract Times.

SC-11.01.B

Add the following new subparagraph to General Conditions Paragraph 11.01.B:

6. Costs associated with retaining Contractor's and others' own or rented equipment on the site, but not utilized, due to work stoppage or any other reason, including but not limited to addressing unforeseen, unknown and differing subsurface or physical conditions.

SC-11.01.C

Amend General Conditions Paragraph 11.01.C by inserting the following words prior to the word "Agreement" at the end of the first sentence:

"…Bid Form which is attached to the..."

SC-11.03.C

Amend General Conditions Subparagraph 11.03.C by inserting the following words at the end of the Paragraph:

"…., in addition to all required labor, material, equipment, facilities and services.

SC-11.03.D

Amend General Conditions Subparagraph 11.03.D by inserting the following words at the beginning of the Paragraph:

D. "Unless otherwise noted in the Bid Form, or elsewhere in the Contract Documents…"

SC-12.01.B.2

Amend General Conditions Subparagraph 12.01.B.2 by deleting the words within the parentheses and replacing them with the following:

…(which may include a fee for overhead and profit in accordance with General Conditions Paragraph 12.01.C.2)…

SC-12.01.C

Amend General Conditions Paragraph 12.01.C by deleting subparagraph 1.

SC-12.01.C.2

Amend subparagraph 12.01.C.2 of the General Conditions by deleting the following words at the beginning of the subparagraph:

"…if a fixed fee is not agreed upon, then…"

SC-12.03

Add the following at the end of General Conditions Paragraph E:

"……Costs resulting from such delays, including but not limited to liquidated damages, regulatory agencies' penalties and delay claims and associate costs by other contractors, shall be deducted, by Change Order, from Contractor's Final Application for Payment in accordance with the Agreement

1. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays attributable by Contractor to the complexity of the Work.

Add the following new Paragraphs immediately after General Conditions Paragraph 12.03.E:

F. When Contractor has submitted to Owner a schedule for completing the Work within a shorter time period than the Contract Times, or Milestones indicated in the Agreement, Contractor will not be entitled to any claims for additional costs, of any type, or delays, if the Contractor-submitted time schedule is for any reason exceeded but its completion date is still within the Contract Times indicated in the Agreement.

G. Contractor shall submit to Engineer detailed documentation, which shall include associated costs, reason(s), and responsible party, for all delays beyond the control of the Contractor.

SC-13.03.B

Amend General Conditions Paragraph 13.03.B by deleting the word "Owner" at the beginning of the Paragraph and replacing it with the following:

"Unless otherwise specified in Section 01025 of the Project Manual, Contractor…"

SC-13.07.C

Delete General Conditions Paragraph 13.07.C and replace with the following:

C. Correction Period for Products placed into service prior to the date of Substantial Completion, as defined in Supplementary Conditions Paragraph SC-1.01.44, shall not begin any earlier than the date of Substantial Completion for the entire Project (the Work).

SC-13.07.F

Add the following new Paragraph immediately after General Conditions Paragraph 13.07.E:

F. The obligations of the Contractor to correct *defective work*, beyond the specified Correction Period, shall survive acceptance of the Work and termination of the Contract by the Owner by an additional time period, which shall begin on the date of discovery of the *defective* work, but not earlier than the date of termination of the specified Correction Period, which additional time period shall be subject to the application of the doctrine of the nullum tempus. Correction of *defective* work during this extended Correction Period shall be at the Contractor's expense.

SC-14.02.A

Add the following new subparagraph immediately after General Conditions subparagraph 14.02.A.3:

4. Conditions relating to payment for Products suitably stored on the Project site or elsewhere, but not yet incorporated in the Work, are given in General Requirements Section 01025 of the Project Manual.

SC-14.04.C

Amend General Conditions Paragraph 14.04.C by deleting the following words from the end of the first sentence and inserting them in the last sentence, after the parenthesis"

". . . , which shall fix the date of Substantial Completion"

SC-14.05.A

Delete General Conditions Paragraph 14.05.A, including its subparagraphs and the heading "Partial Utilization," in their entirety. Delete all other General Conditions references to Paragraph 14.05.A and "Partial Utilization."

SC-14.07.A.2

Amend General Conditions Subparagraph 14.07.A.2.b to read as follows:

b. consent of surety to final payment;

SC-16

Delete General Conditions Article 16 and all references to it elsewhere in the Contract Documents, in its entirety. For dispute resolution, refer to Article 6 of the Agreement.

SC-17.02.A

Delete General Conditions Paragraph 17.02.A in its entirety and replace with the following:

A. When any period of time is referred to in the Contract Documents by "day(s)" it will be defined to mean "calendar day(s)" except when it is contained within a Federal or State legal act, or statute, in which case it will be as defined by the legal act or statute.

SC-17.07

Add the following new Paragraph immediately after General Conditions Paragraph 17.06:

17.07 *Resident Project Representative Responsibilities and Authority*

A. A Resident Project Representative (RPR) will be assigned to the Project site. The responsibilities and authority and limitations thereon of the RPR will be as follows:

1. Schedules: Review the progress schedule and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.

2. Conferences and Meetings: Attend meetings with Contractor, such as pre-construction conferences, progress meetings, pre-installation conferences and other project-related meetings.

3. Liaison:

a. Serve as Engineer's liaison with Contractor, working principally through Contractor's superintendent to assist in understanding the intent of the Contract Documents.

b. Serve as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.

c. Assist in obtaining from Owner or Engineer additional details or information, when required for proper execution of the Work.

4. Shop Drawings and Samples:

a. Receive samples which are furnished at the site by Contractor, and notify Engineer of availability of samples for examination.

b. Advise Engineer and Contractor of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved.

5. Review of Work, Rejection of Defective Work, Inspections, and Tests:

a. Conduct on-site observations of the Work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

b. Report to Engineer whenever any work is unsatisfactory, faulty or defective, or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test, or approval required to be made; and advise Engineer of Work that should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection, or approval.

c. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate personnel and that Contractor maintains adequate records thereof; and observe, record, and report to Engineer appropriate details relative to the test procedures and start-ups.

d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project; record the results of these inspections and report to Engineer.

6. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

7. Modifications:

a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report with recommendations to Engineer. Transmit to Contractor decisions as issued by Engineer.

b. Allow minor deviations from Drawings or Specifications when Resident Project Representative is considered to be in the best position to make such decisions on a timely basis.

8. Records:

a. Maintain orderly files of correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents including all Work Change Directives, Addenda, Change Orders, Field Orders, additional Drawings and Specifications issued subsequent to the execution of the Agreement, Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project-related documents.

b. Monitor Contractor's work on Record Documents.

c. Keep a diary or log book, recording Contractor hours on the job site, weather conditions, data relative to questions on Work Change Directives, Change Orders or changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

d. Record names, addresses, and telephone numbers of all Contractors, Subcontractors, and major suppliers of materials and equipment.

9. Reports:

a. Furnish Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.

b. Consult with Engineer in advance of scheduled major tests, inspections, or start of important phases of the Work.

c. Report immediately to Engineer upon the occurrence of any accident.

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

11. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that certificates, Operation and Maintenance manuals, and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents.

12. Completion: Conduct closeout and final inspections in the company of Engineer, Owner, and Contractor, and assist in preparation of lists of items to be completed or corrected.

13. The authority of the RPR is limited and (s)he is not authorized to:

a. Exceed limitations of authority as set forth in the Agreement or other Contract Documents.

b. Undertake any of the responsibilities of Contractor, Contractor's subcontractors and suppliers, or Contractor's superintendent.

c. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences, or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

d. **Advise on, issue directions regarding, or assume control over safety precautions and programs in connection with the Work, with the exception when, in RPR's opinion, conditions of imminent danger exist. If such conditions exist, RPR shall:**

1) Immediately notify Contractor's on-site safety representative and require that the work be stopped.

2) Concurrently RPR shall immediately notify Owner and Engineer of the work conditions and resulting action.

END OF DOCUMENT

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Description.

B. Project Location.

1.02 PROJECT DESCRIPTION

A. Project generally comprises installation, at the Northeast Tank, of an altitude valve and related piping and controls, within a precast concrete vault and restoration to seeded and other areas disturbed by construction operations.

1.03 PROJECT LOCATION

A. Project sites are located in the City of Aberdeen, Maryland and shown on the "Location Map" on Sheet G1, Drawing S-4527B.

1.04 CONTRACTOR'S USE OF PREMISES

A. Confine construction equipment, the storage of materials and equipment, and operations of workmen to within the Project site.

B. Storage of equipment and materials shall be as allowed under Paragraph A above. Additional storage in excess of that available on site shall be the responsibility of the Contractor. Additional payment will not be made for storing new Products off-site or its transportation to the site when it is required.

C. Assume full responsibility for materials stored on site (including materials for which the Owner has made payment).

D. Transport materials remaining at the completion of the Project for which the Owner has made payment to a storage area designated by the Owner.

E. The Contractor shall limit its use of the premises to the Work indicated, so as to allow for Owner occupancy.
   1. Keep existing driveways and entrances serving the premises clear and available to the Owner at all times. Do not use these areas for parking or storage of materials.
   2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas designated by the Owner. If areas for storage are not available on-site, or if additional storage is necessary, obtain and pay for such storage off-site.

1.05 WORK SEQUENCE

A. Submit a preliminary progress schedule, required by Section 01300, which shows a detailed step-by-step Work sequence, which will achieve compliance with the requirements of this Section 01010.

B. Sequence construction operations to:
   1. Maintain continuous operation of existing facilities, to the maximum extent practicable, throughout the construction period.
   2. Minimize disruption of Owner's operations within the existing facilities.
   3. Maintain continuous utility company services to facilities at the Project site.
   4. Maintain continuous access to the Project site for the Owner.
   5. Maintain continuous full-capacity flow in piping system affected by construction operations throughout the construction period.

1.06 SPECIAL REQUIREMENTS

A. Maintain continuous flow, to the maximum extent practicable, in all pipelines affected by construction operations. When necessary to interrupt or bypass flow, provide temporary facilities, including pumping equipment, capable of handing the flows. Engineer shall approve bypassing, pumping, or other methods of diverting flows. Submit detailed plans for flow diversions, including data on equipment capacities and standby equipment, at the preconstruction meeting. Cost of such temporary flow diversions shall be included in the Contract Price(s).

B. Schedule any required interruption of utility services at times that will least affect the public. Obtain approval from Owner at least seven days prior to such utility service interruptions. If the Contractor's operations result in extended (in excess of one hour) interruption of utility services, make provisions for temporary services to properties affected by the Work. Cost of such temporary services shall be included in the Contract Price(s).

C. When it is necessary to dewater trenches and other excavations provide pumping equipment, capable of handing the flows present; provide standby equipment to protect against equipment breakdown, including but not limited to extra pumps, and power generators. Cost of such equipment shall be included in the Contract Price(s).

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Applications for Payment.

B. Payment for Tests and Inspections.

C. Measurement and Payment.

1.02 APPLICATIONS FOR PAYMENT

A. Submit four copies of Application for Payment at times specified in Paragraphs 14.02 and 14.07 of the General Conditions.

B. Submit Application for Payment on form attached to this Specification Section. **AIA Payment Application form is not acceptable.**

C. Include following Contractor's signed certification on Application for Payment:
The undersigned Contractor certifies that (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied to discharge in full all obligations of Contractor incurred in connection with Work covered by prior Applications for Payment numbered 1 through ___; (2) title to all 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, claims, security interests, and encumbrances (except such as covered by Bond acceptable to Owner indemnifying Owner against any such lien, claim, security interest, or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective, as that term is defined in the Contract Documents.

1.03 PAYMENT FOR TESTS AND INSPECTIONS

A. Include the costs of shop tests and shop inspections in the price of the manufactured Products, and no separate or extra payment will be made for such tests and inspections.

B. Contractor shall employ and pay for the services of an independent firm(s) to perform laboratory and field testing and inspections as required in the various Specification Sections. Obtain approval of the proposed testing and inspection firms from Engineer. Cost of such tests and inspections shall be included in the Contract Price and no separate or extra payment will be made.

1.04 PRODUCTS STORED ON PROJECT SITE

A. Payment will not be made for Products suitably stored on the Project site or at another location, but not yet incorporated in the Work.

1.05 MEASUREMENT AND PAYMENT

A. General: Unit and lump sum prices **shall be all inclusive**; they shall include among other costs, all labor (which consists of the personnel plus the time required to perform each task), material, equipment, facilities and services required to perform the Work as defined in General Conditions Paragraph 1.01.A.50. Refer to General Conditions Paragraphs 3.01.A and B for intent of the Contract Documents.
   1. Additional payment will not be made for removing/relocating trees, fences, signs, mailboxes, or other above or below grade physical obstacles, unless otherwise specified in this Section. These costs shall be included in the lump sum or unit price bid for the item requiring their removal/relocation.
   2. Contractor shall confine construction operations within the temporary and permanent right-of-way, and other limits of work, identified in the Drawings and Specifications. Repair to and restoration of paved, seeded and other areas, damaged by Contractor's operations, outside of the temporary and permanent right-of-way, and other limits of work, identified in the Drawings and Specifications, shall be at Contractor's expense. The repair/restoration work and products shall be as described in the Drawings and the Specifications, and may include, but not be limited to re-grading, topsoil placement, seeding, pavement reconstruction etc.
   3. Additional time, personnel, equipment, services and facilities required to perform a task, in excess of that estimated by Contractor, shall not be a reason for additional costs or extension of Contract Times, unless otherwise specified in the Contract Documents.
   4. Contractor shall submit written request to and receive written authorization by Engineer prior to performing work for "Quantity Adjustments" and "Contingency" items.
   5. The following costs shall also be included in the unit and lump sum prices, as applicable:
      a. Mobilization / Demobilization (refer to Supplementary Conditions Paragraph SC-1.01.A.55 for definitions).
      b. Bonds and Insurance.
      c. Contractor's overhead, profit, burden and other expenses as allowed by the Conditions of the Contract(s).
      d. Furnishing and installation of temporary facilities and controls required by Section 01500.
      e. Storage and transportation of material to/from off-site locations.
      f. Transportation and disposal of construction debris and applicable fees, if any.
      e. Temporary facilities, services and stand-by equipment.
      f. Removal/relocation of existing above or below grade physical features.
      g. Costs associated with protection of underground utilities.

h. Sheeting, Shoring and Bracing of excavated areas.
i. Dewatering of excavated areas.
j. Suitable borrowed (imported) excavated material for backfill and topsoil.
k. Erosion and Sedimentation Control.
l. Start-up and testing.

6. Change Orders: Lump sum and unit prices for Change Orders shall also include the costs listed above under Subparagraph 5.
7. Excavation Classification: All excavation in this project is "unclassified".

B. Furnish and Install, at the Northeast Tank Site, an Altitude Valve Vault, Complete in Place,:
1. Measurement and payment at the lump sum price bid.
2. Payment shall include furnishing and installing precast concrete vault, including hatch, ladder, manhole, piping, valves, electrical/electronic components And other items described in the Drawings and Specifications and connection to power and telemetry; and bedding, backfill to surface restoration depth, pavement and seeded area restoration, flushing testing and disinfection.

C. Miscellaneous Unclassified Excavation (Contingency Item):
1. Measurement and payment per cubic yard at the unit price bid.
2. Payment includes excavation where required by Engineer and not paid for under another pay item, and for test pits to locate unmarked, or incorrectly marked utilities, as directed by Engineer.

D. Miscellaneous Aggregate Backfill (Contingency Item):
1. Measurement and payment per cubic yard at the unit price bid.
2. Payment includes aggregate where required by Engineer and not paid for under another pay item.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

APPLICATION FOR PAYMENT NO.

TO (OWNER): _____ PROJECT NO.: _____ PERIOD TO: _____

FROM (CONTRACTOR): _____ CONTRACT DATE: _____

CONTRACT FOR: _____

CHANGE ORDER SUMMARY		ADDITIONS	DELETIONS
Change Orders approved in previous months by Owner			
TOTAL			
Approved this Month			
Number	Date Approved		
TOTALS			
Net change by Change Orders			

1. **ORIGINAL CONTRACT SUM** $ _____
2. **Net change by Change Orders** $ _____
3. **CONTRACT SUM TO DATE** (Line 1±2) $ _____
4. **TOTAL COMPLETED TO DATE** $ _____
   (Columns B+C on Page 2)
5. **RETAINAGE: ___% of Completed Work** $ _____
6. **TOTAL EARNED LESS RETAINAGE** $ _____
   (Line 4 less Line 5)
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT** (Line 6 from prior Application) $ _____
8. **CURRENT AMOUNT DUE** $ _____
9. **BALANCE TO FINISH, PLUS RETAINAGE** $ _____
   (Line 4 less Line 6)

CONTRACTOR'S CERTIFICATION:

The undersigned Contractor certifies that (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied to discharge in full all obligations of Contractor incurred in connection with Work covered by prior Applications for Payment numbered 1 through ___ inclusive and; (2) title to all 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, claims, security interests, and encumbrances (except such as covered by Bond acceptable to Owner indemnifying Owner against any such lien, claim, security interest, or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective, as that term is defined in the Contract Documents.

Dated _____, 20___

_____
CONTRACTOR

By _____
(Authorized Signature)

Payment of the above CURRENT AMOUNT DUE is recommended.

Dated _____, 20_____

ARRO CONSULTING, INC.
ENGINEER

By _____
(Authorized Signature)

APPLICATION FOR PAYMENT NO.

CONTRACT FOR: _____ PERIOD TO: _____

Project # _____ PAGE 2 OF _____

Item No.	DESCRIPTION OF WORK	CONTRACTOR's Schedule of Values - A				WORK COMPLETED			
						Previous Applic - B		This Period - C	
		Unit	Unit Price	Quantity	Ext. Price	Quantity	Amount	Quantity	Amount
	Totals								
CO No.	**CHANGE ORDERS**								
1 2									
	Totals								

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coordination.

1.02 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Reference surveys.

B. Construction control surveys.

C. Surveys for measurement and payment.

1.02 REFERENCE SURVEYS

A. Location of baselines with reference points and reference benchmarks are shown on the Drawings. Contractor shall provide and pay for the services of a surveyor to establish construction baselines and construction benchmarks from the reference points indicated on the Drawings.

B. Surveys shall be performed by a surveyor registered in the State of Maryland.

C. Obtain approval of proposed surveyor from Engineer prior to the start of field surveys.

D. During progress of the Work, protect and preserve reference points, baselines, and benchmarks. Report to Engineer the loss or destruction of any reference points or permanent benchmarks. Replace any damaged or dislocated reference points or permanent benchmarks at Contractor's expense.

1.03 CONSTRUCTION SURVEYS

A. Provide and pay for surveys to establish locations of the Work.

B. Establish and stake locations for:
   1. Building corners and column lines.
   2. Location of above and below grade structures such as tanks and vaults, and structural elements
   3. Locations and elevations of foundations.
   4. Location and elevations for site improvements including roads, walks, fences, catch basins, culverts, storm drains, embankments, and utility lines.
   5. Location and elevation of service connections.
   6. Location and elevation of pipelines and utilities.

C. Prior to the start of construction, prepare and submit a drawing, prepared by the approved surveyor, certifying that the locations and elevations established by field surveys are in conformity with the Contract Documents.

D. If, during the construction surveys, Contractor discovers an apparent problem with the reference surveys, immediately report this situation to the Engineer. Do not proceed with construction until the problem has been resolved and, if required, the reference surveys have been corrected.

1.04 SURVEYS FOR MEASUREMENT AND PAYMENT

A. Perform surveys to determine quantities of unit price work, including control surveys to establish measurement reference lines. Perform surveys accompanied by the Resident Project Representative prior to starting work.

B. Contractor shall sign surveyor's field notes and shall calculate and certify quantities for payment purposes.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. "Or Equal" and Substitute submittals.

C. Action on submittals.

D. Shop Drawings.

E. Product data.

F. Manufacturers' instructions, certificates and warranties.

G. Construction progress schedules.

H. Submittals specified in other Documents/Sections.

1.02 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Number each submittal. Number shall consist of the following parts, each separated by a dash:
   1. Contract number.
   2. Five-digit Specification Section number.
   3. Two-digit sequence number starting for each Specification Section with 01 and continuing with 02, 03, etc., for subsequent submittals with the same Specification Section number.
   4. Use the fourth part of the number only for resubmittals. For the first resubmittal of a previous submittal, add -R1 to the previous number. For the second resubmittal, change to -R2, and so on.

      As an example of the numbering process for Contract Number 1, the third submittal under Section 03300 would be numbered 1-03300-03, and the second resubmittal of this same submittal would be numbered 1-03300-03-R2.

C. Identify Project, Contractor, Subcontractor, or Supplier. Identify pertinent Drawing sheet and detail number(s), and Specification Section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents. Stamp shall have the following format:

Approved for Contract Requirements

The Contractor's signature below indicates that this Submittal has been checked with the Drawings, Specifications, and site conditions and found to meet all requirements of same including dimensions, and that the Contractor's guarantee fully applies to the Product(s) covered.

RE: Project: _____

Submittal Number: _____

Drawing Sheet Number: _____ Detail Number: _____

Deviations from Contract Documents? No ___ Yes ___ (letter attached)

By: _____
Signature (Contractor)

Contractor's Name: _____

E. Submittals without Contractor's stamp of approval will not be reviewed by Engineer and will be returned to Contractor for resubmittal. Resubmittal will be considered as No. 1 and all others will be at Contractor's expense.

F. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.

G. Submit letter, which specifically identifies deviations from Contract Documents. Identify Product or system limitations, which may be detrimental to successful performance of the completed Work.

H. When a Product is of various sizes, or there are similar Products (e.g. sump and grinder pumps) in the Project, provide a submittal, which includes all identical/similar Products.

I. When a Specification Section includes several Products, submit shop drawings for all Products in a single submittal.

J. Where deviations from Contract Documents will affect the Work of another Contractor, the Contractor making the submittal shall attach a letter from the other Contractor(s) stating that the deviation will either:
   1. Have no effect on the other Contractor's Work; or
   2. Have an effect on the other Contractor's Work and that the Contractor making the submittal has agreed to pay all extra costs associated with the deviation.

K. Provide space for Contractor and Engineer review stamps.

L. Revise and resubmit submittals **within ten calendar days from date of receipt**. Identify all changes made since previous submittal. Where submittal must be held for coordination Engineer shall be so advised by Contractor.

M. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

N. **Incomplete submittals will be returned without review and the receipt will be counted as Submittal No.1.**

1.03 "OR EQUAL" AND SUBSTITUTE SUBMITTALS

A. "Or Equal" and Substitute Products or methods submittals shall be in compliance with Supplementary Conditions Paragraphs SC-6.05.A through SC-6.05.K.

B. The Engineer will determine if a Product or method qualifies and is acceptable as an "Equal" or as a Substitute.

C. Contractor shall be responsible for Engineer's, and others, review time, and for all other costs associated with acceptance of an "Equal" or "Substitute" Product or methods.

D. **Request for "or Equal"/substitute of Product, or method shall be made as a separate submittal, prior to, <u>not</u> as part of a shop drawing submittal.**

1.04 ACTION ON SUBMITTALS

A. Engineer's Action: Where action and return is required or requested, Engineer will review each submittal, mark with the action taken, and where possible return **within fourteen calendar days from date of receipt**. Where submittal must be held for coordination, Contractor will be so advised by Engineer.

B. Submittals returned with **"APPROVED"** action indicate that the information submitted was found to be in conformance with the design concept and in compliance with the requirements of the Contract Documents. The Contractor remains responsible for work-related errors, deviations, and discrepancies in the submittal, but may proceed with performance of the work covered by the submittal.

C. Submittals returned with **"APPROVED AS NOTED"** action indicate that the information submitted was found to be in conformance with the design concept and in compliance with the requirements of the Contract Documents, provided the noted clarifications or corrections are incorporated in the Work and in the Record Documents. The Contractor remains responsible for work-related errors, deviations, and discrepancies in the submittal, but may proceed with performance of the work covered by the submittal. Resubmission of information is not required.

D. Submittals returned with **"RETURNED FOR CORRECTION"** action indicate that: (1) information submitted is at least partially not in conformance with the design concept, (2) information submitted is at least partially not in compliance with the requirements of the Contract Documents, (3) submittal is incomplete and does not include all items required by the individual Specification Sections, or (4) certifications or computations required by the individual Specification Sections have not been included with the Shop Drawings and Product data. Engineer will note the deficiencies or corrections required, and return the submittal to the Contractor. Performance of the work covered by the submittal shall not proceed until corrected information is submitted and approved.

E. Submittals returned with **"NOT AS SPECIFIED"** action indicate that the Engineer interprets the information submitted to be not in conformance with the design concept or not in compliance with the Contract Documents. This action may also indicate non-compliance with the Contractor's responsibility to review information and submit notification of deviations and discrepancies for the Engineer's review. Performance of the work shall not proceed until new information is submitted and approved.

F. Review Action does not establish submitted information as a Contract Document, a Change Order, or authorization to deviate from the Contract Documents.

G. For all re-submittals except the first, Engineer and Engineer's consultants will record man-hours required for review of the re-submittal. Contractor shall be charged for review of such repeat re-submittals at Engineer's (and Engineer's consultant's) current hourly rates. Charges for repeat re-submittals shall be subtracted from Contractor's next progress payment.

1.05 SHOP DRAWINGS

A. Hard Copy Submittals: Submit four (4) hard copies, which will be retained by Engineer, plus the number of copies which the Contractor requires.

B. Electronic Submittals: All submittals may be made electronically, with the exception of the FINAL O&M Manuals, which must be in hard copy.

C. After review, distribute in accordance with Article on "Submittal Procedures" above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.06 PRODUCT DATA

A. Submit (3) sets, (2) of which will be retained by the Engineer.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. After review, distribute in accordance with Article on "Submittal Procedures" above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.07 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual Specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.08 MANUFACTURERS' CERTIFICATES AND WARRANTIES

A. When specified in individual Specification Sections, submit manufacturers' certificates and sample warranties to Engineer for review, in quantities specified for Product data.

B. Indicate Product conforms to or exceeds specified requirements. Submit supporting computations, reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

D. Submit sample(s) of manufacture's warranties to Engineer, for review, in quantities specified for Product Data. Actual Warranty Certificate shall be submitted when specified in Section 01700.

1.09 CONSTRUCTION PROGRESS SCHEDULES

A. Submit four copies of progress schedule for Engineer review. Revise and resubmit as required.

B. Submit revised schedules with each Application for Payment, identifying changes since previous version.

C. Indicate submittal dates required for Shop Drawings, Product data, samples, and Product delivery dates, including those furnished by Owner and under Allowances.

D. Do not include extensions to the Contract Times in revised progress schedules until such extensions have been approved by Owner and Engineer in accordance with Article 12 of the General Conditions.

E. Failure to submit an initial or revised progress schedule acceptable to the Engineer, before or with each Application for Payment may be reason for the Engineer to

recommend the Owner withhold payment of all or part of the amount shown in an Application for Payment until an acceptable progress schedule is submitted.

F. Time unit used on progress schedule: Calendar Day.

G Establish a dollar value for each schedule activity and include on the schedule.

H. Submit a bar chart (Gantt chart) showing, for each activity on each submittal:
1. Anticipated start calendar date.
2. Anticipated completion calendar date.
3. Actual start calendar date.
4. Actual completion calendar date.
5. Percentage of activity completed on calendar date of each submittal.

1.10 SUBMITTALS SPECIFIED IN OTHER DOCUMENTS/SECTIONS

A. Applications for Payment: Section 01025.

B. Requests for Substitutions: General Conditions 6.05, as amended by the Supplementary Conditions Paragraphs SC-6.05.A through SC-605.K.

C. Claim Documentation: General Conditions 10.05 and 12.02.A.

D. Documentation Required with Applications for Progress Payments and Final Application for Payment: General Conditions 14.02.A and 14.07.A.

E. Emergency Crew Names, Addresses, and Telephone Numbers: Supplementary Conditions SC-6.16.

F. Schedule of Values: Section 01025.

G. Record Documents: Section 01700.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.

B. References.

C. Manufacturers' field services and reports.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 REFERENCES

A. Conform to reference standards cited in Specifications.

B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

D. Measurement or payment provisions included in a reference standard are not applicable to this Project.

1.04 INSPECTION AND TESTING LABORATORY SERVICES

A. Method of paying for the services of an independent firm(s) to perform inspection and testing is specified in Section 01025.

B. The independent firm will perform inspections, tests, and other services specified in individual Specification Sections and as required by the Engineer.

C. The independent firm shall submit original reports and test results, in duplicate, to Owner and Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Reports shall be submitted to Engineer within 48 hours after completion of test.
   1. The independent firm shall also submit reports and test results to Contractor.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
   1. Notify Engineer and independent firm at least 24 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

E. Retesting required because of non-conformance to specified requirements will be performed by the same independent firm on instructions by the Engineer. Payment for retesting will be charged to the Contractor.

1.05 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification Sections, require Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, and testing, adjusting, and balancing of equipment as applicable, and to initiate instructions when necessary.

B. Submit report in duplicate to Engineer for review within 14 days of observation.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Regulatory requirements.

B. Temporary water service.

C. Temporary sanitary facilities.

D Barriers.

E. Fencing.

F. Water control.

G. Protection of installed work.

H. Security.

I. Access roads.

J. Parking.

K. Progress cleaning.

L. Safety equipment.

M. Removal of utilities, facilities and controls.

1.02 REGULATORY REQUIREMENTS

A. Comply with applicable laws and regulations of authorities having jurisdiction, including but not limited to building codes, health and safety regulations, utility company regulations, and environmental protection regulations.

B. Provide electrical equipment which is UL listed.

1.03 TEMPORARY WATER SERVICE

A. Owner will provide and pay for water required during construction of the Project.

B. Connect to existing water source for construction operations.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections.

D. Provide temporary pipe insulation to prevent freezing.

1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Existing facilities shall not be used.

B. Provide self-contained single-occupant toilet units of the chemical, aerated-circulation, or combustion type. Units shall be properly vented and fully enclosed with a shell of glass fiber-reinforced polyester or similar non-absorbent material.

1.05 FENCING

A. Where permanent fencing is removed, immediately replace with temporary six-foot-high commercial grade chain link fence to prevent unauthorized access to the Project site.

B. At all construction entrances, install commercial grade chain link gates, with provisions for locking, to prevent unauthorized access to the Project site.

1.06 WATER CONTROL

A. At all times during the construction of Work on this Project maintain the flow of storm water, naturally occurring water and wastewater in existing facilities and channels affected by the Work.

B. See other water control requirements under Section 01560 - “Soil Erosion and Sedimentation Control.”

1.07 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

1.08 SECURITY

A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

B. Protect existing Owner's facilities and operations from unauthorized entry, vandalism, or theft.

C. Coordinate with Owner's security program.

1.09 PARKING

A. Provide temporary crushed stone surface parking areas to accommodate construction personnel.

B. When site space is not adequate, provide additional off-site parking.

1.10 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

C. Remove mud and construction debris on a daily basis from paved surfaces used by the Contractor.

1.11 SAFETY EQUIPMENT

A. First Aid Supplies: Comply with governing regulations.

B. Fire Extinguishers:
   1. Provide wall-mounted fire extinguishers for temporary offices and for work spaces.
   2. Comply with NFPA 10 and 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, and materials prior to Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01560

SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work required by regulations to prevent soil erosion and control sedimentation during Work on the Project.

1.02 CONSTRUCTION SEQUENCE

A. Install all sediment and erosion control measures prior to start of clearing operations.

B. Conduct construction operations in accordance with the following general sequence:
   1. Construction of sediment and erosion control measures including swales, silt fences, and construction entrances.
   2. Clearing, removal of debris, and stockpiling of soil materials.
   3. Construction of stabilized construction roads, temporary parking lots, and construction staging areas.
   4. Excavation.
   5. Construction of underground structures, above ground storage tank, pipelines, and other items required by the Contract Documents.
   6. Backfilling, final grading, paving, seeding, and other ground stabilization.
   7. Removal of temporary sediment and erosion control measures.

1.03 GENERAL SEDIMENT AND EROSION CONTROL METHODS/PROCEDURES

A. In all cases, the smallest practical area of land surface shall be disturbed.

B. Topsoil shall be stripped and placed up slope from proposed construction areas where possible. Topsoil shall be kept separate from all other materials.

C. Stockpiles of stripped topsoil, or excavated material and other erodible/soluble areas and materials shall be stabilized immediately.

D. Excavated material shall be placed up slope from the excavation whenever possible. Runoff from spoil piles shall be directed through a sediment filter structure and discharged in a non-erosive manner. Stockpiles of excavated material shall be stabilized immediately.

E. Utility excavations shall be open only long enough to properly install and inspect all underground facilities in accordance with applicable Specification Sections.

F. Dewatering equipment discharge shall be directed onto a stabilized surface so that erosion does not occur. Discharges shall be directed through a sediment filter structure or sedimentation basin and discharged in a non-erosive manner.

G. Backfilled excavations shall be restored to original type of cover and grade in accordance with Specifications. Temporary stabilization is required for any and all erodible/soluble areas and materials.

H. Areas to be seeded or sodded shall be finish graded with six inches of topsoil unless otherwise specified. Positive drainage shall be maintained away from all structures. No isolated low spots shall be created.

I. All sediment shall be prevented from entering storm drains, or watercourses through use of appropriate sediment filtration Products or systems.

J. Dewatering Operations: Dewatering operations, when required, shall discharge through sediment traps onto non-erodible surfaces. Existing sediment trap structures may be utilized or additional structures may be required.

K. Construction access from unpaved areas to paved areas or streets (public or private) shall be via a stabilized construction entrance. The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto the paved surface. Sediment spilled, dropped, or tracked onto paved surface shall be removed immediately.

1.04 RESTORATION

A. After completion of construction, remove all temporary erosion and sedimentation control devices. Restore areas in which these devices were located to the original condition or to the condition called for by the Contract Documents.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Transportation and handling.

B. Storage and protection.

1.02 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.03 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated Products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

F. Arrange storage of Products to permit access for inspection. Periodically inspect to ensure Products are undamaged and are maintained under specified conditions.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Project record documents.

D. Adjusting.

E. Operation and maintenance data.

F. Warranties.

1.02 CLOSEOUT PROCEDURES

A. General Conditions Article 14 contains detailed requirements for Project closeout. Sequence of closeout procedures is as follows:
   1. Contractor submits written request for closeout inspection to Engineer.
   2. Owner, Engineer, and Contractor conduct closeout inspection.
   3. Engineer prepares "punchlist" of items to be completed and submits to Contractor.
   4. Contractor completes items on punchlist and requests re-inspection.
   5. Engineer and Contractor conduct re-inspection.
   6. If, on the basis of re-inspection, Engineer believes Project to be substantially complete, Engineer prepares and submits to Owner for approval a **tentative certificate of Substantial Completion,** which shall include a list of items to be completed and time limit for their completion. List of items to be completed will include, as applicable to the Project, deficiencies in cleaning and in submittal of spare parts, extra materials, Operation and Maintenance manuals, inspection certificates from regulatory agencies, Record Documents, warranties, and other items required by the Contract Documents.
   7. When Owner approves the tentative certificate, Engineer issues to the Contractor a **definitive** Certificate of Substantial Completion as described in the General Conditions.
      a. The definitive certificate of Substantial Completion fixes the date of Substantial Completion
      b. In no event will the Work be certified as substantially complete until at least 90 percent of the Work is completed.

c. Partial utilization of any portion of the Work does not constitute Substantial Completion.

8. When Contractor completes the list of items, as issued with the **definitive** Certificate of Substantial Completion, he requests final inspection.
9. Owner, Engineer, and Contractor conduct final inspection.
10. If Owner and Engineer agree that all items on the list have been completed, Contractor will submit Final Application for Payment.
11. Contractor submits to the Engineer Final Application for Payment, including all documents required by General Conditions' Paragraph 14.07.A, and any other portion of the Contract Documents; Final Payment will not be made until the Engineer has received these documents. Final Application for Payment shall identify total adjusted Contract Price, previous payments, and amount remaining due.
12. When Engineer approves Final Application for Payment, he submits to Owner with recommendation for payment.
13. Owner makes final payment to Contractor, deducting the amount of liquidated and/or other damages and the amount of any unresolved claims, which have been filed against the Owner in connection with the Work.

1.03 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Remove paint spatters from all exposed surfaces.

C. Remove paint from mechanical and electrical equipment nameplates.

D. Replace filters of operating equipment.

E. Remove debris from limited-access spaces including trenches, equipment vaults, and manholes.

F. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site. Do not burn waste materials, or bury debris or excess materials on Owner's property, or discharge volatile or other hazardous materials into drainage systems. Remove waste materials from the Project site and dispose of in a lawful manner.

H. Sweep and remove stains and foreign deposits from paved areas.

I. Rake landscaped areas.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other Modifications to the Contract.
   5. Reviewed Shop Drawings, Product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product Section description of actual Products installed, including the following:
   1. Manufacturer's name and Product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Drawings.

F. Delete Engineer title block and seal (by crossing out) from Record Drawings.

G. Include the following Contractor's signed statement on each Record Drawing sheet:

   These Record Drawings have been prepared by

   _____

   (Name of Contractor)

   and accurately reflect as-built conditions. Responsibility for accuracy of the Record Drawings rests with the Contractor.

H. Submit documents to Engineer with request for closeout inspection. (See Paragraph 1.02A1 of this Section.).

I. **Certificate of Substantial Completion will not be issued until acceptable Record Drawings have been submitted.**

1.05 ADJUSTING

A. Adjust operating Products to ensure smooth and unhindered operation.

1.06 OPERATION AND MAINTENANCE DATA

A. Furnish Operations and Maintenance manuals for each piece of mechanical or electrical equipment supplied under this Contract.

B. Submit three draft copies of each manual to the Engineer for review at least 30 days prior to the 60 percent payment. At draft stage, inclusion of approved Shop Drawings may be omitted.

C. Following approval of the draft copies and at least 30 days prior to the 90 percent payment, furnish for the Engineer's review and approval three copies of the proposed final manuals, bound in three-ring binders as described below.

D. Engineer must approve the final bound manuals before the first closeout inspection will be conducted.

E. The required number of copies of all sections of the final approved manuals must be received by the Engineer before starting the "Demonstration and Instructions" as described in Section 01650.

F. Include the following materials in the manuals for each piece of equipment supplied under this Contract:
   1. Equipment name, location, and number of units.
   2. Manufacturer's name, address, and phone number.
   3. Name, address, and phone number of the nearest certified manufacturer's representative.
   4. Nameplate data for basic unit as well as components such as motor and drive.
   5. Approved Shop Drawings, corrected to as-built conditions.
   6. Manufacturer's bulletins, schematics, diagrams, and supplemental material which is necessary to provide a complete functional description of the subject equipment and component parts including basic configuration and nomenclature; operating principles and characteristics including test data and performance curves where applicable; dimension drawings; and capacity or conditions of service.
      a. If the manufacturer's bulletins cover more than one size, model, or configuration, clearly indicate the information covering the specific unit or units supplied under this Contract.
   7. Detailed written procedures to be used for all modes of operation including any precautions for personal safety or for prevention of damage to the equipment. This includes initial start-up, normal operation, emergency operation, shutdown, and restarting. Describe required operating checks, calibration, and field performance measurements.
   8. Guides to testing and troubleshooting. Include a chart giving symptoms, probable cause, and remedies.
   9. Instructions with easily understood schematics or diagrams for disassembling and assembling the equipment for overhaul and repair.

10. A lubricating schedule showing lubrication point, frequency, and recommended lubricant, including one or more major brand alternates. Include lubrication recommendations for periods when equipment is in standby or storage.
11. Recommended preventive maintenance measures and frequency of performance. Describe each recommended maintenance measure in terms of procedure, tools, parts, materials, or test equipment necessary to perform the procedure.
12. Complete parts list with parts assembly drawing (preferably by exploded view), recommended list of spare parts to be kept "in stock", and ordering information.
13. Identification of any special tools required for proper maintenance.
14. Any additional information required to maintain equipment warranty.

G. For equipment that will function as part of a system, assemble data in a manner that describes the operation and maintenance of the entire system. Provide systems information described below, corrected to as-built conditions:
1. Process and instrumentation drawings.
2. Ladder diagrams.
3. Wiring diagrams including one-line diagrams, schematic or elementary diagrams, and terminal board identification diagrams.
4. Piping and interconnection drawings.
5. Circuit board schematics with components' models and descriptions.

H. Submit final Operation and Maintenance manuals bound in loose-leaf three-ring binders designed for paper sized 8½ by 11 inches and having black vinyl covers. Larger sized sheets may be folded, no more than twice.

I. Fold Shop Drawings to approximately 8 by 10 inches with drawing title block exposed. Group Shop Drawings descriptive of a single item of equipment together. Place Shop Drawings in clear plastic, three-hole punched sheet protectors.

J. Include in binders Shop Drawings previously submitted for review and approval and bearing the Engineer's stamp of approval and comments.

K. Provide each binder with a title page giving the Owner's name, contract name and number, and date of submission. Provide label on binder spine, giving same data as on title page and showing volume identification if more than one volume is required. Provide, following the title page, an index listing the contents of the documents. Arrange contents by Specification Section. Provide each Section with an indexed tab for quick reference.

L. Subsequent to the Engineer's approval and return of the final bound manuals, submit six complete bound sets of manuals for distribution by the Engineer.

M. **Engineer will not issue Definitive Certificate of Substantial Completion until approved Operations and Maintenance Manuals have been submitted. Partial approvals of the final manual will not be made.**

1.07 WARRANTIES

A. Provide duplicate notarized copies.

B. Assemble documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. Date of warranty shall be no earlier than the date of Substantial Completion.

F. When Work is delayed beyond the initial date of Substantial Completion, provide updated/extended Warranty Certificate within ten days after acceptance of Work, listing date of acceptance as start of warranty period. Costs for providing updated/extended warranties shall be at no cost to the Owner.

G. **For warranties with coverage period exceeding the Correction Period, make provisions for direct assignment of warranty to Owner one year after date of Substantial Completion. Cost for these warranties shall be included in the Contract Price.**

H. **Engineer will not approve Final Application for Payment without approved Warranty Certificates**.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

SECTION 01750

PRODUCT WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General administrative and procedural requirements for preparation and submission of manufacturers' standard warranties on Products and special Project warranties.
   1. Refer to the "Standard General Conditions of the Construction Contract" (the Conditions of the Contract) for terms of Contractor's special warranty of workmanship and materials.
   2. Certifications and other commitments and agreements for continuing services to the Owner are specified in the individual Specifications of the Contract Documents.

1.02 RELATED DOCUMENTS AND SECTIONS

A. Submittals: Section 01300

B. Project Closeout: Section 01700.

1.03 DEFINITIONS

A. Warranty: A written guaranty, which provides assurance to the Owner by Contractor, installer, supplier, manufacturer, or other responsible party, as warrantor, for the quantity, quality, performance and other representations of an individual Product, or group of Products (a system) of the Work, in whole or in part, for the duration of the specified Correction Period.

B. Guaranty: Assurance to the Owner by Contractor, Product manufacturer, or other specified party, as guarantor, that the specified warranty will be fulfilled by the guarantor in the event of default by the warrantor.

C. Standard Product Warranty: Preprinted, written guaranty published by Product manufacturer, for particular Product and specifically endorsed by the manufacturer to the Owner.

D. Special Project Warranty: Written guaranty required by, or incorporated into the Contract Documents, to extend project Correction Period time limits provided by the Conditions of the Contract, or to provide greater rights for the Owner.

E. Correction Period: Correction Period shall be synonymous with "warranty period", "guaranty period" and similar terms used in the Contract Documents. Standard

Correction Period shall be no less than one year from the date of Substantial Completion.

1. Refer to Supplementary Conditions Paragraph SC-13.07.F for correction of *Defective* work after termination of specified Correction Period.

1.04 WARRANTIES AND GUARANTIES

A. General: Contractor shall provide all warranties and guaranties with Owner named as beneficiary. For Products, or their components, bearing a manufacturer's warranty, or guaranty, that extends for a period of time beyond the specified Correction Period, the warranty or guaranty shall identify the extended time period.

B. Specific Warranty and Guaranty Requirements: Refer to individual Specification Sections of Divisions 2 through 16 for specific requirements, including content and limitations.

C. Disclaimers and Limitations: Manufacturers' disclaimers and limitations on Product warranties and guaranties shall not relieve Contractor of responsibility for warranty and guaranty requirements for the work that incorporates such Products, nor shall they relieve suppliers, manufacturers, and installers required to countersign Special Project Warranties with Contractor.

D. Owner's Recourse: Written warranties made to Owner shall be in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.

E. Warranty as Condition of Acceptance: Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment shall be required on such work, or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

F. Related Damages and Losses: When correcting warranted work that has been found defective, Contractor shall remove and replace other work that has been damaged as a result of such defect, or that must be removed and replaced to provide access for correction of warranted work.

G. Replacement Cost: Upon determination that work covered by a warranty has been found to be defective, Contractor shall replace, or reconstruct the work to a condition acceptable to Owner and in accordance with the applicable requirements of the Contract Documents. Contractor shall be responsible for all costs for replacing, or reconstructing defective work, regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life. Contractor shall also be responsible for all costs for replacing, or reconstructing other work that has been damaged as a result of such defect, or that must be removed and replaced to provide access for correction of warranted work.

H. Reinstatement of Warranty: When work covered by a warranty has been found defective and has been corrected by replacement, or rebuilding, Contractor shall reinstate the original warranty, including its time duration, by written endorsement, in accordance with the Conditions of the Contract.

I. Signatures: Final Certificates shall be signed by person authorized to sign warranties and guaranties on behalf of entity providing such warranty or guaranty.

J. Warranty Certificate Submittals: Prior to Project Closeout, Contractor shall submit all written warranties and guaranties to the Engineer for final review and acceptance and shall insert in approved O&M manuals.

1.05 TIME OF WARRANTY

A. Submission of Preliminary Manufacturer's Warranty Certificates: Contractor shall submit to Engineer for review Manufacturer's Warranty Certificate with each Product shop drawings and data submittals. Unless otherwise specified, Contractor shall obtain preliminary copies of Warranty Certificates, and when applicable bonds, within ten calendar days of completion of applicable item, or work; submit in compliance with Section 01300.

B. Submission of Final Warranty Certificates: Contractor shall submit fully executed copies of Warranty Certificates with the final O&M manuals in compliance with Section 01700.

C. Date of Warranties: Commencement date of warranty/guaranty periods shall be not earlier than the date of Substantial Completion.

D. Duration of Warranties and Guaranties: Unless otherwise specified, or prescribed by law, warranty and guaranty periods shall be not less than the Correction Period required by the Conditions of the Contract, but in no case less than one year from the date of Substantial Completion of the Project. See Product Specifications Sections in Divisions 2 through 16 of the Project Manual for extended warranty and guaranty beyond the specified Correction Period.

1.07 WARRANTIES

A. Submit sample warranties along with submission of Shop Drawings and Product Data.

B. Insert approved warranties in the approved final Operation and Maintenance Manuals after the date of Substantial Completion has been established.

C. Assignment of Warranties: Warranties issued by Product/System manufacturers, on material and equipment (including internal components), shall be assigned directly to the Owner.

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D. **Warranties which begin prior to the date of Substantial Completion are not acceptable. When manufacturers' warranties begin on the date of delivery, or any date earlier than the date of Substantial Completion, Contractor shall purchase extended warranties which shall provide coverage at least for the entire Correction Period. Cost for extended warranties shall be included in the Contract Price.**

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION.

PART 3 - EXECUTION

NOT APPLICABLE TO THIS SECTION.

END OF SECTION

SECTION 02012

TEST PITS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Test pits shall include, but not necessarily be limited to, excavation to determine the exact horizontal location and/or elevation of underground structures, utilities, and other obstructions; the backfill and compaction of the excavation; and the stabilization of the surface, in accordance with the Contract Documents.

B. Prior to construction it shall be the Contractor's responsibility to establish the location and/or elevation of existing utilities and structures that may affect the proposed work.

1.02 RELATED WORK INCLUDED ELSEWHERE

A. Trench Excavation, Backfill, and Compaction: Section 02250

B. Restoration: Section 02800

1.03 QUALITY ASSURANCE

A. It is intended that all suitable materials removed from the test pit excavation, exclusive of paving materials, be used for backfill. The Engineer has the right to inspect all material used as backfill to determine the material's suitability for use as backfill.

PART 2 –MATERIALS

2.01 CONTRACTOR'S OPTIONS

A. Use of Excavated Material: All suitable material excavated from test pits shall be used, as far as practicable, for backfill. The Contractor shall properly store or stockpile and protect all materials that are to be reused in the work. The Contractor shall replace, at his own expense, material that was suitable when excavated, which has subsequently become unsuitable because of careless, neglectful, wasteful, or unprotected storage. The Contractor shall have no property right in any material taken from any excavation and no excavated material shall be wasted or otherwise removed from the project site without permission of the Engineer. All unsuitable material shall be removed from the excavation and disposed of off-site in accordance with local, state and federal regulations by and at the expense of the Contractor.

B. Borrow: Borrow material for test pit backfill shall meet the requirements of Section 02250.

C. Graded Aggregate Subbase: Graded aggregate subbase for test pit backfill shall meet the gradation requirements specified in Section 02240.

PART 3 – EXECUTION

3.01. GENERAL

A. It shall be the Contractor's responsibility to determine the location and/or elevation of underground structures and utilities by the use of test pit excavation prior to initiating excavation operations for the installation of the proposed facility. Test pits shall be of the size, depth and location as approved by the Engineer. Should the location and/or elevation thus determined be different from that shown on the Plans, the Contractor shall promptly furnish the correct information to the Engineer so that the impact on the project may be determined.

3.02 TEST PITS

A. The Contractor shall provide all necessary traffic control in accordance with the applicable regulations.

B. Surface preparation, excavation, backfill, compaction, and maintenance of the backfilled excavation shall be as specified in Section 02250 for trenches, except that the limits of the work shall be as approved by the Engineer.

C. Restoration shall be as specified in Section 02800 unless otherwise specified or directed by the Engineer.

END OF SECTION

SECTION 02100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Description:
   1. Clearing and grubbing shall include, but not necessarily be limited to, clearing areas of trees, brush, shrubs, down timber, rotten wood, other vegetation, debris and rubbish, as well as removal of fences and incidental structures; and grubbing or removing from the ground all stumps, roots and stubs, brush, organic materials, and debris, as shown and as specified in the Contract Documents and within the limits of disturbance.
   2. For developer projects, the Contractor shall be responsible for acquiring all required permits associated with tree removal and tree trimming. For capital projects, the Contractor shall obtain a permit for any tree clearing outside of the L.O.D. and within the State Highway Administration right-of-way from the Maryland Department of Natural Resources prior to construction.

B. Quality Assurance:
   1. The County will inspect the work to insure that it is performed in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS

A. NOT APPLICABLE

PART 3 - EXECUTION

3.01 LIMITS

A. General:
   1. Unless otherwise indicated in the Contract Documents, all trees and other growth within the drainage and utility easement or rights-of-way shall be removed. In certain situations, designated trees may be required to be saved and shall be designated on the construction drawings.
   2. Within the limits indicated on the Contract Documents to be cleared and grubbed, the County has the right to designate trees and other growth which the County may desire to leave standing. Unless otherwise shown or specified, the entire width and length of easements shall be cleared and grubbed.
   3. The clearing and grubbing operation shall be completed in its entirety within

100 linear feet in advance of any water and sewer utility construction.

B. Unsuitable Material: Note that after the clearing and grubbing operations are completed, unsuitable materials such as unstable formations, root mat, or swamp muck encountered below the surface of the ground must also be removed and properly disposed.

C. Salvaged Material: When indicated, such materials as leaf mold or other organic materials above the surface of the ground and suitable for use as mulch or topsoil shall be salvaged and stockpiled.

D. Trees, Shrubberies and Plants: Contractor shall schedule a meeting with the Engineerr to review which trees, shrubs, and vegetation, if any, shall not be disturbed. Contractor shall protect them from any damage. Where trees which are left standing are trimmed or become scarred by the Contractor's operations, the cuts or scars shall be repaired by the Contractor. All trimming and repairs shall be done by skilled workmen and in accordance with good tree surgery practices under the supervision of a tree expert licensed by the State of Maryland.

E. Burning: If allowed, the Contractor shall obtain the appropriate permits to allow the burning of trees, brush, trash, or other perishable materials. If burning is prohibited by the Fire Marshall, the Contractor shall remove these materials and dispose of them off-site in permitted disposal facilities.

F. Disposal Locations: Perishable materials and debris shall be removed from the site easement or right-of-way and disposed of at locations off the project and outside the limits of view from the project by the Contractor. The Contractor shall make all necessary arrangements with property owners, in writing, for obtaining suitable disposal locations, and furnish the County with a copy of the agreement. The cost involved shall be included in the price bid. The Contractor shall be responsible for obtaining all State and local permits for the disposal locations and furnish the Engineer with evidence indicating the sites are approved for disposal.

G. Fences: All fences within the easement or right-of-way that are identified to remain shall be removed as carefully as practicable and replaced so that it remains in a condition equal to or better than what existed prior to construction.

H. Excavation Areas: depth of not less than 1-foot below the subgrade or slope surfaces. All depressions made below the subgrade or slope surfaces by the removal of stumps or roots shall be refilled with materials suitable for embankment and shall be compacted in accordance with the requirements in Section 02220.

END OF SECTION

SECTION 02151

SHORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Shoring, sheeting and bracing necessary to protect excavations against loss of ground, caving or slipping.

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Trench shoring materials and methods shall conform to Federal, State, and local laws, rules, regulations, and requirements.
   2. Provide material for sheet piling, sheeting, bracing, and shoring and drive or set in place in accordance with Federal, State and local laws for excavations and construction and as may be required to protect the workers and the public.
   3. Contractor shall assign a competent person who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions.

1.03 PROJECT CONDITIONS

A. Responsibility for Project Safety and Condition of Excavation:
   1. Contractor shall be responsible for complying with all safety, health and sanitation laws, rules, regulations, and guidelines, including but not limited to the Occupational Safety and Health Act (OSHA), 29 CFR 1910 and 29 CFR 1926
   2. The failure or refusal of the Engineer to suggest the use of bracing or sheeting, or type of materials, or to suggest sheeting, bracing, or shoring to be left in place, shall not relieve the Contractor of its responsibility concerning the condition of excavation, or its obligations under the Contract concerning safety precautions and programs in connection with the Work; nor will it impose any liability on the Engineer, or the Owner; nor shall any delay, whether caused by any action, or want of action on the part of the Contractor, or by any act of the Engineer, or the Owner, or their agents, or employees, resulting in the keeping of any excavation open longer than would otherwise have been necessary, relieve the Contractor from the responsibility of properly and adequately protecting the excavation from caving or slipping, nor from any of the obligations under the Contract relating to injury to persons or property, nor entitle Contractor to any claims for extra compensation.

B. Tight Sheeting:
   1. Protect excavations deeper than eight feet with tight sheeting from the top of the original grade to below the structure foundation or to the bottom of utility trench except for excavations where stable rock is encountered. If stable rock is encountered at a depth greater than eight feet but above the structure foundation, or the bottom of utility trench, carry sheet down to the top of the rock.
   2. Include cost for tight sheeting in the unit or lump sum price bid for the item(s) that requires the tight sheeting.
   3. Contractor, at her/his discretion and expense, may use other, OSHA approved, methods for protection of excavations in lieu of tight sheeting.

C. Trenches 5 feet deep or greater shall require a protective system, unless the excavation is made entirely in stable rock. If less than 5 feet deep, Contractor's on-site competent person may determine that a protective system is not required. Protective system for trenches 20 feet deep, or greater shall be designed by a professional engineer, registered in the State of Maryland, or be based on tabulated data prepared and/or approved by a professional engineer registered in the Stateof Maryland, in accordance with OSHA Section 1926.652(b) and (c).

D. The Engineer reserves the right to order sheeting and bracing left in place for the protection of the finished work or adjacent property. Sheeting and bracing which have been ordered left in place by the Engineer must be removed for a distance of three feet below the established or existing grade, whichever is lower. Trench bracing, except that, which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing.

E. Before starting work, check and verify governing dimensions and elevations.

F. Protect existing active sewer, water, gas, electricity and other utility services and structures.

G. Notify municipal agencies and service utility companies having jurisdiction over the areas of work.

H. Comply with requirements of governing authorities and agencies for relocation, removal and discontinuing of services, as affected by this work.

PART 2 - PRODUCTS

2.02 MATERIALS

A. General: Provide suitable shoring and bracing materials which will support loads imposed.

B. Wood Materials: Use wood sheeting, sheet piling, bracing, and shoring which is in good serviceable condition and timbers of sound condition.
   1. If wood is part of shoring system near existing structures, use pressure preservative treated materials or remove before placement of backfill.

C. Steel Materials: Steel sheet piling and bracing of equal strength may be substituted for wood.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Drive or set sheeting, sheet piling, braces or shores in place and arrange such that they may be withdrawn as the excavations are backfilled, without damage to piping and structures, and without damage to or settlement of adjacent structures and pavements.

B. Engineer reserves the right to order sheeting driven to the full depth of the excavation or to such additional depths as may be required for the protection of the work.

C. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

D. When tight sheeting is required, it shall be driven to prevent adjacent soil from entering the excavation either below or through such sheeting.

E. Provide access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet or deeper: locate these devises within 25 feet of all workers.

F. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

G. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

H. Locate bracing to clear permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

I. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Engineer.

J. Maintain bracing until structural elements are re-braced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

K. Install internal bracing, if required, to prevent spreading or distortion to braced frames.

L. Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

M. Repair or replace, as acceptable to Engineer, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface preparation prior to final restoration.

1.02 RELATED SECTIONS

A. Soil Erosion and Sedimentation Control: Section 01560.

B. Paving and Surfacing: Section 02500.

1.03 DEFINITIONS

A. Rock Excavation: Rock Excavation: Consolidated hard mineral material in solid beds or masses, in original or stratified position, and boulders greater than one-half cubic yard in volume, which, in the opinion of the Engineer, must be removed by blasting, or mechanical/chemical wedging. Structure foundations of concrete, masonry, or stone, laid in cement-mortar will also be classified as rock if the volume requiring removal at any single location exceeds one-half cubic yard.
   1. Soft or disintegrated rock, which can be removed with a pick, material which can be broken down by sledge hammers, ledge or single boulder less than one-half cubic yard in volume, loose, shaken or previously blasted rock, broken stone in rock filling or elsewhere, or rock outside the limits of measurement specified, shall not be classified as rock excavation.
   2. Items involved in the excavation such as sidewalks, curbs, and paving, of whatever material, shall not be classified as rock excavation.

B. Earth Excavation: Materials of any kind in the excavation which, in the opinion of the Engineer, cannot be classified as rock excavation.

C. Earth Excavation Below Subgrade: Same as Earth Excavation except such excavation is performed below elevations given as subgrade.

D. Unclassified Excavation: Removal of materials of any kind in the excavation, including rock excavation.

E. Unclassified Excavation Below Subgrade: Same as unclassified excavation except such excavation is performed below elevations given as subgrade.

F. Miscellaneous Unclassified Excavation: Unclassified excavation required by the Engineer and not included in other items for payment.

G. Subgrade: Prepared earth surfaces on or over which additional materials will be placed or work is to be performed. Includes pipe trench bottom and the areas upon which rest the planned bottoms of footings, foundations, slabs, or their aggregate subbase.

1.04 SUBMITTALS

A. Test Reports: Compaction density test reports based on method of density determination as specified in referenced standards and methods as approved by the Engineer.

1.05 SITE CONDITIONS

A. **Classification of Excavated Materials: Under this Contract, all excavation is unclassified. No consideration will be given to the nature of materials, which may include rock, encountered in excavation operations. Therefore, as unclassified excavation, no additional payment will be made for difficulties occurring in excavating and handling of materials.**

B. Environmental Requirements:
   1. Do not perform grading when soil or weather conditions are unsuitable. Unsuitable conditions include moisture saturated or frozen in place soil and precipitation of any kind present on the soil or occurring during the Work.
   2. Exercise the necessary means and methods to control dust on the site as well as in the off site work areas where excavation and grading are required.
   3. Do not leave the site in a dusting condition following the work of this Section. If necessary, employ a watering schedule to control the dust.
   4. Do not use frozen material in performing the work or place materials on frozen surfaces.
   5. When it is necessary to haul soft or wet soil material over roadways, use suitably tight vehicles to prevent spillage. Clear away spillage of materials on roadways caused by hauling at no expense to the Owner.
   6. Plan work so as to provide adequate protection during storms with provisions available at all times for preventing flood damage.

C. Protection: Assume all risks attending the presence or proximity of overhead or underground public utility and private lines, pipes, conduits and support work for same, also existing structures and property of whatever nature, in or over excavations or adjacent to such excavations. Complete responsibility for replacement and restitution work of whatever nature to the above, as damaged or destroyed by work of this Contract, rests solely with the Contractor and at no expense to the Owner.
   1. Outside Rights-of-way: Take necessary precautions to protect trees, shrubs, lawns and such other landscaping from damage. Restitution work for damages rests solely with the Contractor and at no expense to the Owner.
   2. Temporary Protective Construction: Erect and maintain without expense to the Owner, substantial barricades to exclude unauthorized persons or vehicles from entering construction areas.

D. Explosives and Blasting: Not permitted in performance of site grading work.

E. Borrow Excavation: When the required quantity of suitable fill/backfill material exceeds the quantity of suitable on-site excavated material, provide borrow excavated material at no additional cost to the Owner. If borrow excavated material is needed, notify the Engineer sufficiently in advance to permit the Engineer to verify such need and to confirm the proposed borrow material's suitability. Engineer will approve, in writing, borrow excavated material prior to its use. All borrow fill/backfill shall meet the requirements of Item 2.01.A. of this Section.

F. Excess Excavated Material: No right of property in materials is granted the Contractor of excess on site excavated materials prior to completion of Site Work. This provision does not relieve the Contractor of the responsibility to remove and dispose of surplus excavated materials as well as unsuitable material such as sod, stumps and spongy soil, and excess rock, which shall be removed by the Contractor and disposed legally off-site. Costs for loading, transportation and disposal of excess and unsuitable material, and of rock shall be included in the Contract Price

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill/Fill: On-site , or borrow excavated or borrow soil or soil-rock mixed materials free of topsoil, vegetation, lumber, metal, and refuse; and free of rock or similar hard objects larger than six inches in any dimension. Rock to soil ratio shall not exceed one part rock to three parts soil.

B. Coarse Aggregate Material: Use AASHTO No. 57.

PART 3 - EXECUTION

3.01 PREPARATION

A. Salvaged Topsoil: Within the areas indicated for grading, strip turf and topsoil to the depth of suitable topsoil material and stockpile for subsequent topsoiling operations.
   1. Topsoiling: Performed as work of Section 02260.

B. Stockpiling: Place topsoil storage piles separate from other excavated material within the limits of the project, on well-drained land and at locations not interfering with the performance of Work.

3.02 PERFORMANCE

A. Erosion Control: Implement erosion control measures during performance of work of this Section. Erosion Control as specified in Section 01560.

B. Overlot Grading: Perform rough grading over the site within the areas to be graded as indicated on the Drawings.
   1. Topsoiled Areas: Not more than 0.15 ft. above or below indicated grade less specified topsoil depths.
   2. Vehicle Traffic Areas: Not more than 0.10 ft. above or below indicated grade less specified or indicated depths of paving and aggregate base.

C. Removing Obstructions:
   1. Where rock is encountered at proposed subgrade elevations, remove such for a depth of six inches below proposed subgrade.
   2. At excavation bottom, cut rock to form level surface for pipe or foundation bedding.
   3. Removal of Rock by Means Other Than Blasting: Where removal of rock is required remove by the use of mechanical surface impact equipment, by drilling and hydraulic rock splitting equipment, or by other Engineer approved methods.

D. Driveway Excavation: Excavate or otherwise remove and satisfactorily dispose of materials located within the limits indicated on the Drawings for driveways.
   1. Excavate to driveway subgrade depths required, and cut drainage channels and waterways as detailed.
   2. Excavate subgrade material determined unsatisfactory in the opinion of the Engineer. Refill such areas to required elevation with Backfill.

E. Driveway grading: Shape subgrade of driveway, intersections, approaches, entrances and adjoining pedestrian walkways to no more than 0.10 foot above or below the elevations indicated on the Drawings.

F. Driveway Embankments: Materials other than backfill may be used in the construction of embankments. Materials such as shale or other rock formations that can be readily

incorporated in a 36-inch layer may be used. Construction requirements for driveway embankment containing rock shall be as follows:

1. Breakup shale and other rock-like materials formed by natural consolidation of mud, clay, silt and fine sand into a maximum size that can be readily placed and compacted in loose eight inch layers.
2. Place rock to form the base of driveway embankments. Place in uniform loose layers not exceeding in depth the approximate average size of the larger rock, but not exceeding 36 inches deep.
3. Do not dump rock in final position. Position rock by blading or dozing in a manner that will minimize voids, pockets, and bridging.
4. Smooth and level each layer adding coarse aggregate material in sufficient quantity to supplement the smaller rock pieces in filling the voids and pockets.
5. Form the top 18 inches of driveway embankments with Backfill and construct in the same manner specified for formation of embankments other than those containing rock.
6. Compact embankment material to a final density of not less than 90 percent of the maximum dry weight density at its optimum moisture content.
7. Borrow Excavation materials required for embankment shall meet the requirements of Backfill. During the excavation operation keep the borrow area graded to ensure free water drainage. Following completion of work in the borrow area grade the area to present a uniformly trim appearance merging into the surrounding terrain and to prevent serious erosion.

G. Compaction: Compact finished subgrades to the minimum final density percentages specified herein which are based on the maximum dry weight density of subgrade materials at their optimum moisture content.
   1. Overlot Grading: Not less than 90%.
   2. Driveway Subgrade: Not less than 95%.

H. Corrections: Correct driveway subgrade irregularities exceeding previously specified limits to the Engineer's satisfaction either by removing or adding material as required, followed by rolling until satisfactorily compacted.

I. Driveway Base Course and Surface Construction: As specified in Section 02500.

3.03 FIELD QUALITY CONTROL

A. Surface Tolerance: Check finished subgrade for smoothness and elevation in accordance with the following:
   1. Use an approved template shaped to conform to the design requirement indicated on the Drawings for checking crown and contour of driveway.
   2. Use an approved ten-foot straightedge to check for longitudinal irregularities in the subgrade.
   3. Use string lines for controlling the finished elevation of driveway subgrade. Maintain such lines until surface irregularities have been satisfactorily corrected.

B. Field Moisture-Density Tests: When deemed necessary by the Engineer the Contractor will be required to conduct a minimum of two field moisture-density determinations on Site Grading work at locations designated by the Engineer.
   1. The moisture content at which the maximum density of the Backfill is obtained with a given compactive effort, AASHTO T99, shall be considered the optimum moisture content.
   2. Determine compaction density of embankment in accordance with AASHTO T191.
   3. Determine compaction density of driveway in accordance with AASHTO T191.
   4. Field compaction density may be determined by the Rubber Balloon Method, ASTM D2167, or other acceptable method, in lieu of the sand-cone method specified above; but only with Engineer's written permission.

END OF SECTION

SECTION 02220

STRUCTURAL EXCAVATION, BACKFILL, AND COMPACTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Materials and Performance Methods for Structural Excavation, Backfill, and Compaction.

1.02 RELATED SECTIONS

A. Sediment and Erosion Control: Section 01560.

C. Shoring: Section 02151.

D. Grading: Section 02210.

F. Cast-In-Place Concrete: Section 03300.

1.03 DESCRIPTION

A. Definitions: As specified in Section 02210.

1.04 QUALITY ASSURANCE

A. Source Quality Control:
   1. Laboratory Tests: Certain materials stated herein under Products may require advance examination or testing according to methods referenced, or as required by the Engineer.
      a. Testing laboratory shall furnish both Engineer and Contractor two (2) copies of test result reports. Same reports will be considered as sufficient evidence of acceptance or rejection of materials represented.

1.05 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

B. American Society For Testing and Materials (ASTM):
   1. ASTM C33, Concrete Aggregates, Spec. for.
   2. ASTM D698, Moisture-Density Relations Of Soils Using 5.5/lb. (2.5 kg) Rammer and 12-in. (304.8-mm) Drop.
   3. ASTM D1556, Density of Soil In Place By the Sand-Cone Method.
   4. ASTM D2167, Density of Soil In Place By the Rubber-Balloon Method.

5. ASTM D2922, Density Of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth).
6. ASTM D3017, Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7. ASTM D2487, Classification of Soils for Engineering Purposes.

C. Testing Agency: As approved by the Engineer with the following required qualifications.
1. Laboratory and field testing must be performed under the general supervision of a Registered Professional Engineer.
2. The independent testing agency must have experience in quality control of similar types of projects.
3. Contractor shall engage the Geotechnical Engineering firm identified in the Structural Drawings (S series) to provide recommendations and perform testing related to excavations and earthwork structural fills.

1.06 SUBMITTALS

A. Testing Agency Approval: Submit experience qualifications of the proposed independent testing agency for approval.

1.07 SITE CONDITIONS

A. **Classification of Excavated Materials: Under this Contract, all excavation, which may include rock, is unclassified.**

B. **Soil Strength: Contractor shall confirm soil strengths at structures locations prior to commencing with foundation work. Note that the Geotechnical Report, provided for information only, indicates that several locations may require removal and replacement of existing soft, loose soils in order to properly prepare the subgrade.**

C. Environmental Requirements:
1. As specified in Section 02210 and such added requirements included herein.
2. Do not perform excavating, backfilling or compacting when weather conditions or the condition of materials are such, in the opinion of the Engineer, that work cannot be performed satisfactorily.
3. Do not use frozen materials as backfill nor wet materials containing moisture in excess of the amount necessary for satisfactory compaction.
4. Prior to use, moisten dry backfill material not having sufficient moisture to obtain satisfactory placement or compaction.
5. Accommodation of Drainage: Maintain sewers, drains and ditches free of debris for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted. Do not direct flow of water across or over pavements except through approved pipes or properly constructed troughs. Provide pipes or troughs of such sizes and lengths as may be required. Control

grading in the vicinity of excavations so the ground surface is properly pitched to prevent water running into excavated areas.

6. Pumping: Keep excavations free from water. Build dams and other devices necessary for this purpose, including lowering the water table below excavation bottom by deep wells, well points and pumping. Provide and operate pumps of sufficient capacity for dewatering the excavations. Dispose of water removed from excavations in a manner that will not cause injury to the public health, to public or private property, to the work of other Trades or Contractors, to any portion of the work completed or in progress or produce impediment to the use of highways, roads, lanes and streets by the public. No additional payment will be made for pumping or other difficulties encountered due to water.
7. Control groundwater and surface water during construction in order to maintain soil stability. Maintain the water table elevation sufficiently below the levels of excavations that slopes will remain stable and bottoms of excavations will not become loosened by flow of water. If the foundation material looses its strength due to improper dewatering techniques, overexcavate the material and replace it with Structural Foundation Backfill at the Contractor's expense. For excavations near an existing structure, the dewatering shall be controlled so as not to cause settlement or damage to the existing structure(s).

D. Dust Control: To prevent spread of dust during performance of work of this Section, thoroughly moisten excavation areas by sprinkling or other methods as approved by the Engineer.

E. Explosives and Blasting: Not permitted.

F. Removal of Rock by Means Other Than Blasting: Where removal of rock is required, remove by the use of mechanical surface impact equipment, by drilling and hydraulic rock splitting equipment, or by chemical methods.

G. Responsibility For Condition of Excavation: The Contractor shall solely be responsible for the condition and results of excavations made by him. Slides and cave-ins shall be removed without extra compensation at whatever time and under whatever circumstances they may occur.

H. Protection:
1. The Contractor shall, at its own expense, sustain in their places, and protect from direct or indirect injury, all pipes, structures or property in the vicinity of its work, whether above or below ground, or that may appear in the excavation. Contractor shall at all times have a sufficient quantity of appropriate material and equipment on site and shall use them as necessary for sheeting excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened.
2. Pipes and underground conduits exposed as a result of the Contractor's operations shall be adequately supported along their entire exposed length by timber or planking, installed in such manner that the anchorage of the supporting members will not be disturbed or weakened during the backfilling operation. Backfill of

selected material shall be carefully rammed and tamped under and around the pipe or conduit as the supports are removed.

3. The Contractor shall take all risks attending the presence or proximity of pipes, poles, power lines or wires, structures and property, of every kind and description, in or over its excavation, or in the vicinity of his work, whether above or below the surface of the ground; and shall be responsible for all damages and assume all expense for direct or indirect injury, caused by its work, to any of them, or to any person or property by reason of them or by reason of injury to them, whether such structures are or are not indicated on the Drawings.
4. In the event of encountering subsurface streams or similar dangerous contingencies, or where passing especially heavy buildings or any structures which by their construction or position might bring a great pressure upon the excavations, the right is reserved by the Engineer to require that such buildings or structures shall be underpinned, or supported and protected, or that special sheeting shall be driven in such a manner and to such depth, as may be approved or that only a short length of excavation shall be opened at one time; and furthermore, if necessary, that the excavation shall be securely sheeted and braced on all sides; after the manner of a shaft, and that the permanent work shall be constructed in the same way and the shaft backfilled before another opening is made. Any work performed as required above shall be at the cost and sole liability of the Contractor.
5. The Engineer reserves the right under such conditions to stop the excavation or any other part of the work, and to require the Contractor to complete the structure and the backfilling up to such a point as the Engineer, without assuming responsibility for safety to persons or property may require before proceeding further with the excavation; and the Contractor shall not thereby become entitled to demand or to receive any allowance or compensation, other than an extension of the contract time for as many days as the Engineer may determine that the work was delayed by such stoppage.

I. Removal of Obstructions:
   1. Except for known utility relocations shown on the Drawings, remove obstructions as specified hereinafter.
   2. Should the position of any pipe, conduit, pole, or other structures, above or below the ground be such as, in the opinion of the Engineer, to require its removal, realignment, or change due to work to be done under the Contract, the work of removal, realignment, or change will be done as extra work, or will be done by the owner of the obstructions, without cost to the Contractor; but the Contractor shall uncover and sustain the structures, at his own expense, before such removal and before and after such realignment or change as constituting part of the Contract; and the Contractor shall not be entitled to any claim for damage or extra compensation on any account of the presence of said structure, or on account of any delay in the removal or rearrangement of same.
   3. The Contractor shall, without extra compensation, break through and reconstruct, if necessary, the invert or arch of any sewer, culvert, or conduit that may be

encountered, if the said structure is in such a position, in the judgment of the Engineer, as not to require its removal, realignment, or complete reconstruction.

4. The Contractor shall not interfere with any person, firms or corporations or with the Owner, in protecting, removing, changing, or replacing their pipes, conduits, poles, or other structures; but he shall allow said persons, firms, or corporations, or the Owner, to take all such measures as they may deem necessary or advisable for the purpose aforesaid, and the Contractor shall thereby be in no way relieved of any of his responsibilities under the Contract.
5. Trees in rights-of-way shall not be cut down except by authorization of the Engineer. The Contractor shall have no claim for extra compensation owing to the fact that he may be required to excavate by hand, or tunnel, in the vicinity of trees that may be ordered left standing. Shrubbery which would interfere with the construction shall be carefully removed, protected and replanted or replaced without additional cost to the Owner.

J Borrow Excavation: Where the required quantity of backfill exceeds the quantity of suitable material excavated within the limits of the project site and rights-of-way, obtain sufficient material to complete the backfill at no additional cost to the Owner. If borrow excavation is needed, notify the Engineer sufficiently in advance of borrow excavation requirements to permit the Engineer to verify the need for such borrow excavation and to view the proposed borrow pit. Borrow excavation from outside sources must be suitable in all respects and will be subject to the approval of the Engineer, whose written consent must be obtained before its use will be permitted. All borrow fill shall meet the requirements of Paragraph 2.01.A. of this Section.

K. Excess Materials: No right of property in materials is granted the Contractor of excavated materials prior to backfilling. This provision does not relieve the Contractor of his responsibility to remove and dispose of surplus excavated material.

L. Change of Excavation Location:

1. Should the Engineer require a change in location of excavation from that indicated on the Drawings due to the presence of an obstruction, or from other cause and such change is made before the excavation is begun, the Contractor shall not be entitled to extra compensation or to a claim for damages.
2. Should the Engineer require a change in location of any excavation from that indicated on the Drawings due to the presence of an obstruction or from any other cause, and if such changed location increases or decreases the quantity of excavation, then an adjustment will be made in the lump sum price bid under which the work was performed.
3. The adjustment will be made by increasing or decreasing the lump sum price bid in accordance with the actual increase or decrease in excavation quantities by applying the applicable unit price per cubic yard for Miscellaneous Unclassified Excavation bid under the Schedule of Unit Prices for Quantity Adjustments.
4. If a change in location made at the requirement of the Engineer involves the abandonment of excavation already made, such abandoned excavation, together with the necessary refill will be classed as Miscellaneous Unclassified Excavation.

5. If a change of excavation location is authorized by the Engineer upon the Contractor's request, the Contractor shall not be entitled to extra compensation, and if such change of excavation location involves the abandonment of excavation already made, the abandoned excavation and refill shall be at the Contractor's expense.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Backfill:
   1. On-site excavated soil and borrow fill, classified as ML or SM in accordance with ASTM D2487, free of topsoil, organic material or vegetation, lumber, metal and refuse; and free of rock or similar hard objects larger than three inches in any dimension, with the exception that highly plastic clays and silts will not be permitted. Rock to soil ratio shall not exceed one part rock to three parts soil.
   2. Borrow structural backfill shall meet the following criteria:
      a. Free of organic matter, ash, cinders, frozen material, and demolition debris.
      b. Plasticity Index less than 10.
      c. Less than 15%, by weight, rock fragments larger than 3 inches; 30%, by weight, larger than 3/4 inches; and less than 30%, by weight, smaller than No. 200 sieve.
   3. No time extensions will be granted to Contractor in order to make on-site soils acceptable (drying times, etc.) or to use borrow backfill.

B. Aggregate Material and Structural Foundation Backfill: As described on the Drawings and required by the tank foundation designer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform soil erosion control work in accordance with requirements of Section 01560.

B. Perform sheeting and shoring in accordance with requirements of Section 02151.

3.02 EXCAVATION

A. General:
   1. Perform excavation using machinery, except that hand excavation may be required where necessary to protect existing structures, buried utilities or private or public properties. No additional compensation will be paid for hand excavation instead of machine excavation as may be necessary from any cause whatever.

2. Perform excavation of every description and of whatever substances encountered to the lines and grades or depths indicated by the Drawings and as specified herein.
3. Where work space is limited, remove excavated material from the limited area and replace the material after the structure has been installed. No additional compensation will be made for such removal and replacement.
4. Extend excavation a sufficient distance from footings, and foundations to permit placing and removal of concrete formwork, installation of services, other construction and for inspection.
5. Loose or soft soil zones shall be removed and replaced with structural backfill.
6. Foundations shall not bear on fill material or soft/loose residual soils.
7. Footing bottoms shall be tamped with jumping-jack type hand compaction equipment, after excavation, to confirm stability and compact any loose soils present.

B. Rock Excavation: Remove rock below subgrade that is shattered due to rock removal operations and in the opinion of the Engineer is unfit for foundations. Fill to subgrade with Structural Foundation Backfill those areas where shattered rock has been removed. Perform such backfilling to the satisfaction of the Engineer. No separate or additional payment will be made for such removal and backfill.
   1. To minimize differential settlement, if bedrock is encountered above the proposed foundation elevation, excavate rock 2 feet below proposed bearing elevation and place compacted structural fill to proposed bearing elevation. No separate or additional payment will be made for such removal and backfill.

C. Removal of Rock by Means Other Than Blasting: Where removal of rock by means other than blasting is required, remove by the use of mechanical surface impact equipment, or by drilling and hydraulic rock splitting equipment, or by other methods.

D. Excavation Below Subgrade:
   1. Do not excavate below depths indicated on the Drawings or such depths as required by the Engineer.
   2. Excavation below depths indicated on the Drawings or as required by the Engineer, through the fault of the Contractor, shall be restored to the indicated or required depths with Structural Foundation Backfill or other material as selected by Engineer, at the expense of the Contractor.
   3. If the foundation for any structure is required by the Engineer to be carried lower than plan subgrade elevation, the voids caused by this excavation shall be backfilled up to plan subgrade elevation with Structural Foundation Backfill.
      a. Payment for this additional work will be made at the applicable unit prices bid for Miscellaneous Unclassified Excavation.

E. Storage of Approved Materials: If approved materials are not used immediately, store or stockpile the various approved materials separately and apart from unapproved materials.
   1. Mixing of various approved materials is not permitted, nor is mixing of approved materials with unapproved materials permitted.

2. No additional compensation made for storage, stockpiling, or rehandling of materials.

F. Borrow Excavation: Perform excavation of borrow material in a manner satisfactory to the Engineer. Strip borrow pits of brush, trees, roots, grass and other vegetation prior to removal of material for use in backfill. During the excavation operation, grade the borrow area to insure free drainage of water from the area. After completion of the excavation, grade the excavated area, including side slopes, to drain and present a uniformly trim appearance merging into the surrounding terrain. After borrowing operations are completed, regrade area, if necessary, to prevent erosion.

G. Areas to receive compacted structural backfill shall be excavated a minimum of 5 feet beyond the foundation perimeters.

3.03 SUBGRADE PREPARATION

A. General:
1. Prior to construction of foundations or slabs on natural soils, and before placing any new fills, proof roll subgrade with a 10-ton vibratory roller under the observation of the Engineer, to check for any loose or unstable areas. Proof rolling shall extend a minimum of ten (10) feet beyond all proposed building lines.
2. When directed by Engineer, remove soft, loose and disturbed materials and replace with structural foundation backfill.
   a. Payment for this additional work will be made at the applicable unit prices bid under the Schedule of Unit Prices for Quantity Adjustments.
3. Do not place fill materials of any type on surfaces that are muddy, frozen, or contain frost.
4. Trim bottoms to indicated lines and grades to leave solid base to receive other work.
5. The base of all excavations resulting from removal of existing structure foundations, slabs, and utilities shall be proof rolled to confirm stability prior to backfilling.
6. All excavations shall be maintained free of water. Contractor shall, at all times, have on site dewatering equipment.

3.04 BACKFILLING

A. General:
1. Perform backfilling using machinery, except that hand backfilling may be required where necessary to prevent displacing walls, foundations or buried utilities or damage to such. No additional compensation will be paid where backfilling by hand is required.
2. After completion of footings and walls and the removal of forms and prior to backfilling, clean excavation free of trash and debris.

3. Do not place Backfill material prior to seven days after completion of structure walls.
4. Do not place Backfill material on wet or frozen areas.
5. Do not operate heavy equipment closer to walls than a distance equal to the height of Backfill material above the top of the structure footing.
6. Perform compaction using power driven tampers or compactors suitable for material being placed.

B. Placement and Compaction:
1. Structural Foundation Backfill: Provide at locations indicated on the Drawings and where directed by the Engineer.
   a. Maintain material in a moist condition during hauling, placing and compacting.
   b. Spread material uniformly without segregation of coarse and fine material.
   c. Place material in lifts not exceeding 8-inches in loose thickness and compact to maximum dry density based on ASTM D1557, modified proctor, as follows:
      1) Slabs-on-grade, foundation support, paved areas, and walkways: 95%.
   d. One field density determination is required for each layer of material placed.
   e. Structural Backfill Concrete (2500 psi): Provide at locations indicated on the Drawings and/or where directed by the Engineer.
2. Aggregate Subbase Course: All construction areas shall be proofrolled prior to placement of subbase and again before placement of concrete or bituminous paving.
   a. A minimum of 6-inches thick beneath concrete slabs for structures and other locations as indicated on the Drawings.
   b. Place directly on excavation bottoms and where required on complete structural fills.
   c. Compact densely with a vibratory compactor to the satisfaction of the Engineer.
3. Aggregate Backfill: Place uncompacted in areas shown on the Drawings and where directed by Engineer.

C. Cleanup: Excess excavated material that cannot be used at the project site shall be removed and disposed of off the site in a legal manner at no additional expense to the Owner.

3.05 FIELD QUALITY CONTROL

A. Testing: Performed by the independent testing agency as prior approved for laboratory testing.
1. In-place field density tests conducted in accordance with ASTM D1556, ASTM D2167, or ASTM D2922. If methods of ASTM D2922 are used for density testing, the moisture content must be determined as stated in ASTM D3017.

2. Perform at least one field moisture-density determination (test) for each layer of material placed.
3. Test locations as directed by the Engineer.
4. The Engineer may require additional tests whenever necessary to ensure that the specified density is being obtained.

B. Corrective Measures: Whenever tests indicate that the field moisture or density does not meet specified requirements, take corrective action as approved by the Engineer.
1. Corrective measures may include loosening the soil and wetting or drying it prior to recompaction, additional compaction, or removing and replacing the material.
2. Retest material that did not meet the moisture and density requirements after corrective measures have been performed.

C. Retesting: The Engineer may at any time require retesting of any material, whether in stockpiles or being placed, if it appears that the material differs from that which has previously been approved for use.

END OF SECTION

SECTION 02240

AGGREGATE BACKFILL

PART 1 – GENERAL

1.01 DESCRIPTION

A. Aggregate backfill shall include, but not necessarily be limited to, furnishing and placing granular material for the installation of pipes and manholes indicated on the plans, and in accordance with the Contract Documents.

1.02 RELATED WORK INCLUDED ELSEWHERE

A. Structural Excavation, Backfill, and Compaction: Section 02220

1.03 QUALITY ASSURANCE

A. All aggregate fill material will be subject to test to determine the material's compliance with the Contract Documents.

PART 2 – PRODUCTS

2.01 DETAILED MATERIAL REQUIREMENTS

A. Aggregate fill material for the installation of pipes, hydrants, manholes, vaults and miscellaneous structures as noted in the Standard Details shall meet the requirements of AASHTO M43, Size 57.

B. Aggregate fill material for subgrade stabilization shall meet the requirements of AASHTO M 43, Size 3.

C. Aggregate backfill material that meets the Maryland SHA requirements for graded aggregate subbase may be used with the approval of the Engineer.

PART 3 – EXECUTION

3.01 INSTALLATION

A. If areas of the foundation are soft, composed of mud, or are, in the Engineer's judgment, unfit to receive the pipe, structure, concrete, or masonry, then such unacceptable material shall be removed and replaced with aggregate fill material as directed by the Engineer.

B. The aggregate backfill material shall be carefully placed to the dimensions indicated on the plans or directed by the Engineer.

C. Except for Size 57 or 3, all aggregate backfill material shall be compacted.

D. Aggregate fill shall not be dropped from heights in excess of 5 feet above utility.

END OF SECTION

SECTION 02260

FINISH GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Final grading.

1.02 RELATED SECTIONS

A. Site Grading: Section 02210.

B. Turf Establishment: Section 02820.

1.06 SITE CONDITIONS

A. Environmental Requirements: Do not perform Work of this Section when soil or weather conditions are unsuitable. Unsuitable conditions include moisture saturated or frozen in place soil and precipitation of any kind present or occurring during the Work.

B. Existing Conditions: Following performance of related construction and prior to finish grading, remove debris and perform site leveling in preparation for Finish Grading. Dispose debris legally off-site.

C. Dust Control: Control dust on the site and at the off-site work areas where Finish Grading is required.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil: Use on-site or borrowed fertile, friable, natural, productive surface soil. Use topsoil free of subsoil, clay, stones, or similar hard objects larger than 2 inches in greatest dimension, and partially disintegrated debris and materials toxic or harmful to growth.

B. Borrow Topsoil: Use productive topsoil from Contractor's source and of a quality meeting the requirements specified above for Topsoil. Provide borrow topsoil only if quantity of stripped and stockpiled, or other acceptable on-site topsoil is not sufficient.

C. Soil Supplement, Seed Mixes and Erosion Control Geotextile Material: As described in Section 02820.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform initial site grading as specified in Section 02210.

B. Prepare subsoil surface for finish grading by dressing and shaping to provide for the uniform placement of topsoil.

C. Prepare subsoil surface for top soiling by loosening to a depth of 4 inches and dressing and shaping to provide for the uniform placement of topsoil.

D. Remove surface rock or other foreign objects exceeding 3 inches in greatest dimension. Dispose of such rock and debris in a lawful manner off-site.

3.02 PERFORMANCE

A. Placement: Placement of topsoil shall begin after all work in areas scheduled to be finish graded is completed. Place topsoil over areas indicated for new grading contours.
   1. Do not place topsoil over areas indicated to receive paving or walkways.
   2. Do not work topsoil while frozen or wet.
   3. Do not work topsoil in a dusting condition but moisten same to prevent a dust nuisance.
   4. Scarify subsoil to a depth of 2 inches for bonding topsoil with subsoil.
   5. Work topsoil into subsoil, on sloped areas, and blend to prevent slip-planing between the two soils; leave sufficient cover of topsoil to ensure seed germination. Perform blending of soils by ridging or serrating the subsoil on the slopes.
   6. Dress-up minor depressions, due to settling and erosion, and eliminate other minor irregularities, by placing topsoil in these areas.

B. Finished Elevations and Lines: Grade top soiled areas at the site to within a tolerance of ± one-tenth of a foot of the elevations and lines indicated and in accordance with the following:
   1. Grade a uniform longitudinal fall in swales and other surface drainage areas to provide a drainage flow line that can easily be maintained and traversed with normal lawn maintenance equipment.
   2. Establish finish grade of topsoil 1/2 to 3/4 inch below top of abutting walks or paving to provide positive drainage of same.
   3. Finish-grade topsoil to a minimum depth of 6 inches and a maximum depth of 12 inches.
   4. Finish-graded surfaces shall be left free of objectionable material larger than 2 inches in greatest dimension. Dispose of such objectionable material in a legal disposal area off-site.

C. Compaction: Perform final compaction of finish grades using a light roller weighing not over 120 pounds per foot-width of roller.

D. Tillage: Till soil over areas indicated for lawn regardless of type of lawn work performed. Use equipment and methods common to such work, and till soil to a two-inch depth minimum.

E. Soil Supplement Addition: Soil supplements for lawn areas may be incorporated into the soil during tillage operations.

F. Seeding: Sow seed mixtures when air current is low and not more than five days after soil supplements have been applied. Sow seeds in two applications using either mechanical power seeders or mechanical hand seeders. Sow one-half of the seed mixture in one direction over designated areas and the remainder at right angles to the first sowing. Seeding rates as indicated on the Drawings.

G. Seed Cover: Imbed seed mixtures into topsoil 1/4 inch using a light drag or rake and moving in directions parallel to the contour lines. Immediately after dragging or raking, compact seeded areas using a cultipacker or similar design lawn roller, weighing 60 to 90 pounds per linear foot of roller, and roll at right angles to existing slopes.

H. Contractor Option: Seeding and soil supplement application may be performed by the hydroseeding method. Rates of application, methods and equipment shall be approved by Engineer.

I. Lawn Mulching: Evenly apply mulch over seeded areas not more than 48 hours after seeding. Start mulching at windward side of relatively flat areas, or at the upper part of slopes. Spread mulch in a total coverage at a depth not less than 1½ inches nor more than 3 inches.

J. Mulch Binding: Immediately following mulch spreading, apply mulch binder to anchor mulch to the soil. The number of passes over the mulch as needed to secure it firmly shall not exceed three passes with maximum applied binder not exceeding 10.0 gallons per 1,000 square feet.

3.03 MAINTENANCE

A. Maintenance operations shall begin immediately after seeding and shall continue throughout the guarantee period.
   1. Seeded Areas: Keep seed moist continually for proper germination, and water thereafter as necessary to prevent drying out or burning. Reseed areas not showing a prompt catch of grass, correct depressions and irregularities, and reseed; repeat until a complete coverage is obtained. Cut seeded areas at required intervals to maintain grass at a maximum height of 2½ inches

B. At conclusion of maintenance period, the Engineer shall make an inspection of the lawn work to determine condition of acceptance. Make such additional repairs as required by the Engineer. Perform such work at no expense to the Owner.

END OF SECTION

SECTION 02444

CHAIN LINK FENCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fence Fabric and Frame Components.

1.02 QUALITY ASSURANCE

A. Fabricator Qualifications: Continuing member of the Chain Link Fence Manufacturer Institute (CLFMI).

B. Erector Qualifications: Provide at least one person in a supervisory capacity who is skilled and experienced in erecting chain link fence and who readily understands the proposed layout and is completely familiar with current erection practices of the CLFMI. Said person shall be present at all times during progress of the fence installation.

C. Design Criteria: Chain link type with top rail and bottom tension wire and single extension arms carrying three strands of barbed wire. Fabric, height and overall height, including barbed wire extension shall match existing fence design and height.

D. Product Compatibility: Provide chain link fence components products of one manufacturer.

1.03 SUBMITTALS

A. Shop Drawings and Product Data: Submit in compliance with Section 01300. Submit manufacturer's published details modified to suit design and field conditions. Manufacturer's descriptive literature and specifications covering the products specified. Descriptive literature shall include installation information.

B. Certificates: Include in Submittals certified mill certificates indicating material conformity to yield strengths of these Specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanizing: Ferrous metal elements of the fence shall receive zinc coating by the hot dip process after fabrication. Metal coated to 1.8 oz. of zinc coating per square foot of

surface, in a smooth finish, free from dross, uncoated spots and foreign materials, ASTM A123.

B. Galvanized Fabric: No. 9 gauge galvanized steel wire having a hot-dipped zinc coating of 1.2 ounce per square foot of wire surface. Fabric interwoven in a 2-inch mesh with top and bottom selvage edges both twisted and barbed. Fabric shall conform to ASTM A392.

C. Galvanized Barbed Wire: Three lines of steel wire with a Class 3 galvanized coating per ASTM A121. Barbed wire consists of two 12½ gauge stranded line wires, with 14 gauge round wire barbs in a four point pattern on three-inch centers.

D. Galvanized Tension Wire: Six gauge coil spring wire galvanized of same quality and process as specified for Fabric.

E. Framework: Roll-formed shapes or tubular members with zinc hot-galvanized coating per ASTM A123. Framework shall be comprised of the following components:
   1. Line Posts: Nominal two-inch roll formed shapes or tubular members fabricated from 50,000-psi minimum yield strength steel and weighing 2.34 lbs. per ft.
   2. End, Pull and Corner Posts: Nominal three-inch roll formed shapes or tubular members fabricated from 42,000 psi minimum yield strength steel and weighing 5.10 lbs. per ft.
   3. Gate Posts: Nominal four-inch steel pipe or tubular members fabricated from 30,000 psi minimum yield strength steel and weighing 9.10 lbs. per ft.
   4. Post Braces: Nominal 1¼-inch steel pipe weighing 2.27 lbs. per ft. minimum, with 3/8-inch diameter truss rod and adjustable take-up device. Provide two brace assemblies at each corner post and one brace assembly at each end and gatepost.
   5. Top Rail: Nominal 1¼-inch steel pipe weighing 2.27 lbs. per ft. minimum.
   6. Barbed Wire Supporting Arms: Designed for three strands and of sufficient strength to withstand without failure, 200 lbs. downward pull at one end of arm. Set arms at 45-degree angle toward outside of site.
   7. Post Tops: Where barbed wire supporting arms are not required cover post ends with pressed steel or malleable iron, weather tight caps designed to permit passage of top rail, if any.
   8. Stretcher Bars: One piece 3/16 x 3/4-inch bar of length equal to full height of fabric. Provide one bar for each gate and end post and two for each corner and pull post. Provide 1/2-inch wide stretcher bar bands spaced not over 15 inches O.C. to secure stretcher bars to posts.

F. Concrete: As specified in Section 03300.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Remove existing fencing to the extent indicated in the Drawings.

B. Do not begin fence installation prior to completion of all forms of Site work.

C. Drill or dig holes for post footings in firm, undisturbed or compacted soil. Size and depth of hole as shown on the drawings. Space posts a maximum of ten feet on center.

D. Place concrete around posts in a continuous pour. Tamp concrete for consolidation. Check each post for vertical and top alignment. Crown top of post footings to shed water.

E. Install braces so posts are plumb when diagonal rods are under proper tension.

F. Install tension wires before stretching fabric and tie to each post with ties or clips.

G. Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tensions after pulling force is released.

H. Thread stretcher bars through fabric and secure to posts with metal bands spaced not over 15 inches O.C.

I. Install three strands of barbed wire parallel on each extension arm on security side of fence. Pull wire taut.

END OF SECTION

SECTION 02500

PAVING AND SURFACING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Bituminous Pavements.

1.02 REFERENCES

A. The "MDT Sections" noted herein refer to sections contained in the Maryland Department of Transportation, State Highway Administration, Standard, Specifications for Construction and Materials, latest edition. The references pertain only to materials, construction, equipment, methods and labor. The payment provisions do not apply to work to be performed under this Contract.

1.03 SUBMITTALS

A. Certificates: Furnish certification from bituminous and aggregate producer attesting that materials conform to requirements of Maryland DOT.

1.04 PROJECT CONDITIONS

A. Protection:
   1. Protect paved surfaces outside of the limits of work. Repair pavement outside limits damaged by constructing operations at no additional expense to the Owner.
   2. The Contractor shall be liable for damages to roads caused by his equipment. The repairs may include lane or full roadway width overlays as directed by authority having jurisdiction over roadway. No additional payment will be made for repairs to roads damaged by the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bituminous Materials and Pavements: As indicated on the Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pavement Removal:

1. Saw cut and remove existing pavement to neat lines equidistant from the centerline of the trench.
2. Initial pavement removal will be to width indicated on the Drawings.
3. Prior to permanent pavement restoration, saw cut and remove trench edge pavement one foot from each edge of trench. If pavement is removed or disturbed for a greater width than indicated on the Drawings, without written authorization of the Engineer, the Owner will require the Contractor to replace such pavement without compensation.

3.02 INSTALLATION

A. General: Contractor shall restore all paving disturbed by construction operations.
   1. Restoration to areas outside of pay-line width shall be at the Contractor's expense.

B. Bituminous Pavement Construction: Method of preparing mixture, placing mixture, compaction, and protection of in-place bituminous concrete for paving shall comply with MDT Section 504. Minimum thickness of bituminous courses as indicated on the Drawings.

C. Dust Control: Provide effective dust control by sprinkling water, by the use of calcium chloride or by any other methods approved by the Engineer. Use dust control measures where, when and in a manner required by the Engineer.

3.03 CLEAN-UP AND MAINTENANCE

A. During construction, surfaces of all areas including, but not limited to, roadways, and driveways shall be maintained on a daily basis to produce a safe, desirable, and convenient condition.
   1. Paved areas shall be swept and flushed after backfilling, and recleaned as dust, mud, stones and debris caused by the work, or related to the work again accumulates.
   2. Failure of the Contractor to perform this work shall be cause for the Engineer to order the work to be done by others, and backcharge all costs to the Contractor.

B. Repair or Correction of Unsatisfactory Conditions: All unsatisfactory conditions resulting from the work shall be corrected.

C. Continuously maintain temporary pavement without additional compensation until it is replaced with permanent pavement.

END OF SECTION

SECTION 02800

RESTORATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Restoration shall include, but not necessarily be limited to all clean up and disposal of waste materials and the re-stabilization of disturbed areas including , as applicable, paved areas, non-paved areas, concrete improvements, street signs, mail boxes, fences, trees, shrubs and other improvements whether shown in the Contract Documents or not.

1.02 RELATED WORK INCLUDED ELSEWHERE

A. Test Pits: Section 02012.

B. Clearing and Grubbing: Section 02100.

C. Aggregate Backfill: Section 02240

D. Turf Establishment: Section 02820

E. Cast-In-Place Concrete: Section 03300

PART 2 – PRODUCTS

2.01 GENERAL

A. Materials shall be furnished in accordance with the Contract Documents and the current edition of the Approved List of Suppliers and Materials for Water and Sewer Main Construction.

PART 3 – EXECUTION

3.01 GENERAL

A. After the completion of backfilling, all materials not used therein shall be removed and disposed of in such a manner and at such point or points as shall be approved or directed by the Engineer; and all roads, sidewalks, and other places on the line of the work shall be left free of debris, clean, and in good order. Said cleaning-up shall be done by the Contractor without extra compensation; and if he shall fail to do such work within twenty four hours after receipt of notice, the

Engineer may arrange to have the cleaning-up done by others; and the cost shall be retained out of the monies due or to become due to the Contractor under the Contract. In case of emergency, the Engineer may restore or remove and dispose of materials wherever necessary without giving previous notice to the Contractor, and the cost of doing so shall be retained from any monies due to become due the Contractor under the contract.

3.02 PAVED AREAS

A. Immediately upon completion of the trench backfill and compaction as previously specified, the Contractor shall provide graded aggregate subbase, temporary bituminous surfacing material as per the Contract Documents and/or direction of the governing regulatory agency.

B. Weather permitting, the Contractor shall remove and dispose of the temporary surfacing materials, cut-back the edge of the existing pavement as per the Contract Documents, and permanently patch-pave the area as specified in the Contract Documents and/or governing agency direction. This shall be done within 30 calendar days after backfilling and compacting the trench as described in the paragraph above or within the time period specified by the governing agency.

3.03 CONCRETE IMPROVEMENTS

A. Sidewalks, curbs, combination curb and gutter, drive aprons, and other concrete improvements removed, soiled, or damaged by the Contractor's activities shall be cleaned or replaced by the Contractor in kind, or as directed by the Engineer and/or Contract Documents without extra compensation.

3.04 NON-PAVED AREAS

A. Immediately upon completion of the trench backfill and compaction as previously specified, the Contractor shall temporarily stabilize the area in accordance with the Contract Documents.

B. Weather permitting, within 14 days after the completion of trench backfill and compaction, the Contractor shall permanently stabilize the area with seeding and mulching or sodding, as noted in the Contract Documents.

3.05 STREET SIGNS, MAIL BOXES, FENCES, SHRUBS, TREES, AND OTHER IMPROVEMENTS

A. Existing street signs and traffic control devices stored or relocated by the Contractor will be reset by the Contractor after construction in the area is complete and the work approved by the Engineer.

B. In case of emergency, the Engineer may reset street signs and traffic control devices wherever necessary without giving previous notice to the contractor; and the cost of doing so shall be retained from any monies due to become due the contractor under the contract.

C. Mail boxes shall be carefully removed by the Contractor to the extent required to permit construction operations and as directed by the Postal Service. It shall be the Contractor's responsibility to temporarily reset mail boxes during construction to maintain service until the boxes are permanently reset in their original locations or at locations designated by the Postal Service. The Contractor shall comply with all Postal Service regulations regarding the location and height of all mail boxes disturbed by his activities.

D. Existing fences, paper boxes, signs, property markers, and other similar items shall be carefully removed by the Contractor to the extent required to permit construction operations and as directed by the Engineer. The Contractor shall safely store all items during the time that they are down and when possible, re-erect them in the original locations or at locations designated by the Engineer.

E. Shrubs, hedges, and other plantings shall be transplanted with sufficient earth to insure that no damage to their major root system occurs. After transplanting has been accomplished, it shall be the Contractor's responsibility to water all plants until their growth is established.

END OF SECTION

SECTION 02820

TURF ESTABLISHMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Turf establishment shall include, but not necessarily be limited to, soil preparation, seeding, fertilizing, mulching, liming as required, over seeding, and re-fertilizing all areas disturbed by construction and where designated for turf establishment in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.01 DETAILED MATERIAL REQUIREMENTS

A. Ground Limestone: Ground limestone shall contain not less than 80% calcium and magnesium carbonates. Dolomitic or magnesium limestone shall contain at least 10% magnesium as magnesium oxide. The limestone shall be ground to meet the following size gradation:

Sieve Sizes U.S. Standard	Percent Passing by Weight
No. 10	100
No. 20	98
No. 100	50

B. Fertilizer:
   1. Fertilizer analysis shall be 5-10-10. It shall be a standard commercial grade fertilizer meeting the requirements of all State and Federal regulations and standards of the Association of Official Agricultural Chemists. Commercial fertilizer shall provide the minimum percentage of available nutrients specified.
   2. Fertilizer shall be furnished in bulk or new, clean, sealed, and properly labeled bags. Fertilizer failing to meet the specified analysis may be used as determined by the Engineer providing sufficient materials are applied to comply with the specified nutrients per unit of measure without additional cost to the Owner.

C. Seed:
   1. Seed lots must be state certified and blended under the supervision of the Maryland Department of Agriculture (MDA), Turf and Seed Section.
   2. All seed and labeling must fully comply with the Maryland Seed Law and these Specifications.

3. Each container shall have permanently affixed to it an accurate analysis tag and a certification tag.
4. All seed lots to be used in this mixture shall have been pretested by the Maryland Seed Laboratory to insure compliance with Specifications.
5. A quality control sample of the delivered mixture may be submitted to the Maryland Seed Laboratory for testing prior to payment and any lots found not to comply with the Specifications shall be returned at the Contractor's expense.
6. The Engineer's representative shall collect all seed certification tags and/or sod certification prior to the beginning of any seed or sod work.
7. No seed shall be used after date of expiration.
8. Seed type and application rates:
   a. For sunny and partly shaded improved areas which are mowed regularly: Sow the following mixtures at 195 pounds per acre or 4.5 pounds per 1,000 square feet between March 1 and May 31 and between August 15 and October 31:

Grass Type	Percent	Certified Grass Species
Tall Fescue	90-100	Adventure, Apache, Arid, Falcon, Finelawn I or Rebel II
Kentucky Bluegrass	0-10	Common, Kenblue, Vica, Ram 1 or Monopoly

   b. For heavily shaded improved areas which are mowed regularly: Sow the following mixtures at 175 pounds per acre or 4 pounds per 1,000 square feet between March 1 and May 31 and between August 15 and October 31:

Grass Type	Percent	Certified Grass Species
Tall Fescue	65	Adventure, Apache, Arid, Falcon, Finelawn I or Rebel II
Perennial Ryegrass	10	All Star, Blazer, Manhatten, Palmer, Pennant, Pennfine, Premier, Prelude, Regal or Repell
Creeping Red Fescue and/or Chewings Fescue	25	Penlawn, Flyer, Long fellow Victory or Jamestown

   c. For unimproved areas not to be mowed: Sow mixture at 175 pounds per acre or 4 pounds per 1,000 square feet between March 1 and May 31 and between August 15 and October 31:

Grass Type	Percent	Certified Grass Species
Tall Fescue	80	Kentucky 31 (K-31)
Perennial Ryegrass	20	Common

   d. Certified grass seed shall consist of Tall Fescue mix consisting of 33%, 33%, and 34% of three (3) of the following varieties of improved Tall Fescue: Adventure, Arid, Bonanza, Apache, Mustang, Olympic, Rebel, Trident. All seed varieties shall meet the following minimum specifications:
      1) Minimum Purity 98%

2) Minimum Germination 85%
3) Maximum Other Crop 0.1%
4) Maximum Weed Seed 0.1%
5) Noxious Weeds None

* Must be free of ryegrass, timothy, orchard grass, bentgrass, Canada bluegrass, clover, or any other contaminant which shall be unsightly and uncontrollable.

** Must be free of dock, cheat, chess, chickweed, crabgrass, plantain, and black magic.

*** Must be free of all Maryland prohibited and restricted noxious weeds.

D. Mulch:

1. Mulches shall be free of clay, stones, foreign substances, plant parts of Canada Thistle and Johnsongrass, and reasonably free of other weed seeds. Mulches containing Canada Thistle and Johnsongrass shall not be used for any purposes.
2. Straw, hay, and salt mulches shall not contain sticks larger than 1/4-inch in diameter or other materials which would prevent matting down during application. No straw, hay, or salt hay mulches shall be used within 48 hours after cutting. Straw, hay, and salt hay shall be free from mold and other objectionable material and shall be in an air-dry condition suitable for placing with mulch blower equipment.
3. The following mulches may be acceptable by visual inspection provided they meet the above and following requirements:
   a. Straw: Straw shall consist of thoroughly threshed wheat, rye, or oat straw.
   b. Hay: Hay shall consist of native grasses or other plant material approved by the Engineer. Hay shall be free of noxious weed seeds as specified in the Maryland Seed Law.
   c. Salt Hay: Salt hay shall consist of well cured beach grasses or other approved material.
   d. Wood Cellulose Fiber: Wood cellulose fiber shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state. Wood cellulose fiber shall contain a green dye that will provide easy visual inspection for uniformity of the slurry spread. The wood cellulose fiber, including dye, shall contain no germination or growth inhibiting properties. The material shall be manufactured and processed in a manner that the wood cellulose fiber will blend with seed, fertilizer, and other additives to form a homogeneous slurry. The wood cellulose fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the equipment. The manufacturer shall certify that wood cellulose fiber meets the following requirements:

Requirements	Specification Limits
Particle Length	Approximately 3/8 inch
Particle Thickness	Approximately 3/64 inch

Net Dry Weight Content	Minimum stated on bag
ph, ASTM D778	4.0 to 8.5
Ash Content, ASTM D586	1.6% maximum
Water Holding Capacity	90% minimum

The material shall be delivered in packages of uniform weight not exceeding 75 pounds net weight and bear the name of the manufacturer, the net weight, and a supplemental statement of net weight content.

e. Mulch Binder: Mulch binder shall be emulsified asphalts, or wood cellulose fiber meeting the requirements specified above under subparagraph D.3.d.

f. Water: Water used in the planting or care of vegetation shall be free from oil, acids, alkalis, salts, or any substance injurious to plant life. Water from streams, lakes, ponds, or similar sources shall not be used unless the source is approved by the Engineer.

PART 3 – EXECUTION

3.01 SEEDING SEASONS

A. Seed shall be sown from February 15 to May 1 and from August 15 to October 15 inclusive as soon as the soil is dry enough to allow proper penetration of a seedbed. Extensions beyond these time periods may be granted by the Engineer, depending upon weather conditions for the period in question. Any planting outside of these seasons shall be solely at the Contractor's risk and shall not be subject to compensation until stabilization has been accomplished in accordance with these Specifications. No seeding shall be done on frozen ground or when the temperature is 32°F or lower.

3.02 SCHEDULE OF PROCEDURE

A. The Contractor shall begin his work at a point or points approved by the Engineer. When topsoil is required for areas to be seeded, all topsoiling shall be completed before seeding operations are started.

3.03 SOIL PREPARATION

A. Soil shall be properly prepared as indicated hereafter. When performing restoration at existing homes or businesses with established lawns the top 2" of backfill shall be screened topsoil with 3/8" maximum stone aggregate or root matter. All areas to be seeded shall meet the finished grades shown on the plans and be free of any weed or plant growth. When ground limestone is required, it may be incorporated as part of the loosening for soil preparation. All areas shall be loosened by discing, harrowing, or other approved methods immediately prior to seeding, unless otherwise directed by the Engineer. All clods, loose stones, and other foreign materials which are larger than 3 inches in any dimension shall be removed. All gullies, washes, or disturbed areas that develop subsequent to final dressing shall be repaired before seeding.

3.04 SEEDING

A. Seeding shall consist of soil preparation and application of seed, fertilizer, and mulch. Seed application shall be by either of the following application methods as the Contractor may elect:

B. Dry Application Method:
   1. Ground Limestone: Ground limestone, shall be applied, at rates as determined by soil test or no less than 50 pounds per 1000 square feet, separately before the application of any fertilizer or seed on seedbeds which have previously been prepared. Where ground limestone is required to be worked in, the seedbed shall again be properly graded and dressed for seeding. Limestone shall be worked into seedbeds as follows:

Seedbed	Depth of Limestone Incorporation
4 inches of topsoil	3 inches
2 inches of topsoil	2 inches
Subsoil, serrated cut slopes, and other non topsoiled areas 3:1 and steeper	Incorporation not required

   2. Fertilizer: Fertilizer of the analysis 5-10-10 shall be applied to topsoiled areas at a rate of 50 pounds per 1000 square feet.
   3. Seed Application: Strip seeding along trench excavations, etc., shall be applied at a rate of 6 pounds per 1,000 sq. ft. Seed in large areas, around buildings, along streets, etc., shall be applied at a rate of 175 pounds per acre. After seeding, the areas shall be lightly raked and rolled. Areas which do not "catch" shall be reseeded at an interval of fourteen (14) days, which shall continue until a satisfactory growth of grass is established over the entire area.

C. Wet Application Method
   1. General: Apply seed and fertilizer (ground limestone, if required) by spraying the material on previously prepared seedbeds in the form of an aqueous mixture using the methods and equipment described herein. The rates of application shall be the same as those specified for the Dry Application Method.
   2. Spraying Equipment: The spraying equipment shall have a water tank equipped with a bar or liquid level gage calibrated to read in increments not larger than 50 gallons over the entire range of the tank capacity. The gage shall be mounted to be visible to the nozzle operator. The tank shall also be equipped with an agitation system capable of keeping all the solids in the mixture in complete suspension at all times until used.
   3. Ground Limestone:
      a. Ground limestone, if required, shall be sprayed separately from mixtures of seed and fertilizer on areas flatter than 3:1. The water-limestone mixture

shall contain a maximum of 600 pounds per 100 gallons. The water limestone mixture shall be applied at a minimum rate of 1000 gallons per acre. The water-limestone mixture shall be worked into the topsoil. After working the ground limestone into the topsoil, the seedbed shall again be properly graded and dressed.

b. Ground limestone shall not be required to be applied separately on slope areas 3:1 and steeper. The water-seed-fertilizer and limestone mixture shall be applied at a minimum rate of 1000 gallons per acre in the relative proportions specified so that these combined solids do not exceed 600 pounds per 100 gallons.

4. Application:
   a. Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which ground limestone, if required, has been incorporated. Seed and/or fertilizer shall be mixed together with water in the relative proportions specified so that these combined solids do not exceed 300 pounds/100 gallons. The water-seed-fertilizer mixture shall be applied at a minimum rate of 1000 gallons/acre.
   b. All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All seed mixtures in aqueous agitation shall be used within eight hours after mixing, except for leguminous seed which shall be used within one hour after mixing. Seed mixtures not utilized within the time limits shall be wasted and disposed of in a legal manner.
   c. The mixtures shall be applied by high pressure spray equipment which shall always be directed upward into the air so the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in a manner to produce erosion or runoff.
   d. Particular care shall be exercised to insure that application is made uniformly at the prescribed rate and to guard against misses and overlaps. Proper predetermined quantities of the mixture, as specified, shall be used to cover specified sections of known area. Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or collecting containers over the area at intervals and observing the quantity of material deposited thereon.
   e. The spray method shall not be used during periods of high winds which prohibit satisfactory spray patterns.
   f. Seed and fertilizer applied by the spray method need not be raked into the soil.
   g. Any spray or residual which disfigures or otherwise damages existing structures or vegetation shall be thoroughly cleaned from the damaged surface.

3.05 MULCH APPLICATION

A. Mulch materials shall be furnished, hauled, and evenly applied on the area shown in the Contract Documents and/or as directed by the Engineer. All mulch shall be applied

within 48 hours after seeding. Mulch applied by hand shall provide a loose depth of not less than 1.5 inches nor more than 3 inches. Mulch applied by the blowing method shall provide a loose depth of not less than 1 inch nor more than 2 inches, and 95% of the mulch shall be 6 inches or more in length. Mulch applied by the above methods shall achieve a uniform distribution and depth so no more than 10% of the soil surface is exposed. Mulch applied either by hand or the blowing method shall be spread evenly over all seeded areas at the rate of 2.0 tons per acre.

B. If the mulch is to be secured with a mulch anchoring tool, the rate shall be 2.5 tons per acre. If the tracking method is used, the rate of mulch shall be 1.5 tons per acre.

3.06 SECURING MULCH

A. Mulch may be secured by any of the following methods except the mulch anchoring tool.

B. Where mulch has been secured with either an asphalt binder or wood cellulose fiber binder, it will not be permissible to walk on the slopes after the binder has been applied. The Contractor is warned that in the application of asphalt binder material he must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the seeded area and that he will be held responsible for any such damage resulting from his operations. He will be required to place temporary protective covers over existing signs just before seeding and mulching. The covering shall be immediately removed after seeding and mulching operations are completed.

C. Peg and String Method: If the peg and string method is used, the mulch shall be secured by stakes or wire pins driven into the ground on 5-foot centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be driven nearly flush to the ground to draw the twine down tight onto the mulch.

D. Spray Method: If the spray method is used, all mulched surfaces shall be sprayed with the selected binder material so the surface has a uniform appearance. Mulch binder may be sprayed on the mulched slope areas from either the top or the bottom of the slope. A spray nozzle of approved design must be used. The nozzle shall be operated at a distance of not less than 4 feet from the surface of the mulch. Uniform distribution of the binder material will be required. A pump or an air compressor of adequate capacity shall be used to insure the uniform distribution of binder material.
   1. Asphalt Binder: Asphalt mulch binder shall be uniformly applied to the mulch at the rate of approximately 8.0 gallons per 1000 square feet, or as directed by the Engineer. The minimum-maximum rates of application shall be 6 and 10 gallons per 1000 square feet depending on the type of mulch and the effectiveness of the binder securing it.
   2. Chemical Binder: Wood cellulose fiber used as a binder shall be applied at a net dry weight of 750 pounds per acre. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 pounds of wood cellulose fiber per 100 gallons.

E. Mix Method: If the mix method is used, the mulch shall be blown onto the area by a mulch blower; and the binder material shall be sprayed into the mulch as it leaves the mulch blower. For rates of application, see Spray Method above.

F. Anchoring Tool Method: If the mulch anchoring tool method is used, the mulch shall be incorporated into the soil to a minimum depth of 2 inches.

G. Tracking Method: If the tracking method is used, the mulch shall be incorporated into the soil with a bulldozer having steel cleats with a minimum depth of 1.5 inches. Upon completion of tracking, the mulch shall be further secured as described for the spray method.

3.07 WOOD CELLULOSE FIBER

A. Wood cellulose fiber used as a mulch shall be applied at a net dry weight of 1,500 pounds per acre. The wood cellulose fiber shall be mixed with water at a maximum rate of 50 pounds of wood cellulose fiber per 100 gallons. This wood cellulose fiber may be permitted to be used in the following areas:
   1. Narrow disturbed areas up to 8 feet wide adjacent to pavement where traffic created gusts of wind could cause problems with straw;
   2. Deep or high slope areas inaccessible to straw application by a mulching machine.

3.08 REPAIR OF DEFECTIVE AREAS

A. The responsibility for maintaining treated areas shall be as follows. Until the Project is finally accepted, the Contractor will be required to repair or replace any seeding or mulching that is defective or damaged. When, in the judgment of the Engineer, such defects or damages are the result of poor workmanship or failure to meet the requirements of the Contract Documents, the cost of necessary repairs or replacement shall be borne by the Contractor. However, once the Contractor has completed the seeding and mulching of any area in accordance with the provisions of the Contract Documents and to the satisfaction of the Engineer, no additional work at his expense will be required. Subsequent repairs and replacements deemed necessary shall be made by the Contractor and will be paid for as additional work or extra work.

B. When either the Dry or Wet Application Method is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density. If, when the Contract has been completed, it is not possible to make an adequate determination of color, density and uniformity of such stand of grass, payment for the unaccepted portions of the areas will be withheld until these requirements have been met.

END OF SECTION

SECTION 03400

PRECAST CONCRETE UTILITY STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Description: Section includes valve vault complete in place, including hatch, ladder, ladder post, exhaust piping, water piping and valves, of the configuration indicated on the Drawings and in accordance with the Contract Documents.

B. Related Work Included Elsewhere
   1. Structural Excavation, Backfill, and Compaction: Section 02220
   2. Piping and Miscellaneous Items: Section 15370.

C. Quality Assurance
   1. All manufacturers of pre-cast concrete utility structures shall possess a current certification from the National Pre-cast Concrete Associate (NPCA). The manufacturer shall submit the current certification to the Engineer upon request.
   2. The Engineer will inspect all materials prior to installation. Any pre-cast concrete sections which are not in compliance with the required dimensions; which are not true, square, plumb, symmetrical; which have honey-combing; cracks, chips; which do not have smooth surfaces; or otherwise have visible material defects shall be rejected and removed from the project site. Rejected materials may not be repaired but shall be replaced with new products. Cosmetic defects, if in the opinion of the Engineer, will not affect the integrity, longevity and water tightness of the structure, may be allowed in writing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Detailed Material Requirements:
   1. Precast Vault:
      a. Design Criteria
         1) Structural design for precast units shall be prepared by a Maryland registered Engineer for the precast concrete manufacturer. Units shall be designed for HS 20 load designation or 300 pounds per square foot live load, whichever is most critical for determining the concrete and steel stresses.
         2) Where more than one standard is referenced for any given unit, should there be a conflict, the more stringent requirement as determined by the Engineer, shall apply.

3) Unit configuration shall be as shown on the Plans and/or Standard Details.

4) Distribution of earth loading and live load shall be in accordance with ASTM C 857 or ASTM C 890.

5) Walls shall be designed using an equivalent fluid pressure of 83 pounds per cubic foot and a 2 foot surcharge. The units shall also be designed to resist all stress encountered during casting, handling, and erection.

b. Construction:

1) The precast units shall be factory cast. Job site casting will not be permitted. Concrete in the precast elements shall be continuously placed to prevent formation of seams. The finished units shall be free of voids and cracks. Exposed corners and edges shall be beveled. All inserts shall be securely attached or embedded in their proper location.

2) Concrete strength of all precast units at 28 days shall be 4000 psi minimum, unless otherwise specified. It shall be the precast unit manufacturer's responsibility to insure that the specified concrete strength is maintained throughout production of the units. Mix design shall be those previously used by the manufacturer, which have proven satisfactory for casting units similar to those specified and producing the required strength. All precast concrete shall be air entrained in accordance with AASHTO M154. Admixtures containing calcium chloride shall not be used.

3) Vault wall sleeves, or gaskets for piping, access hatch and other inserts shown on the Drawings shall be cast into the structure or inserted at the place of manufacture.

4) Mechanically seals shall be used for cored openings.

5) Pre-cast concrete vault shall meet the material and manufacturing requirements of ASTM C478, except the minimum 28-day compressive strength of the concrete shall be 4000 psi. Joints shall meet the requirements of ASTM C443, shall be self – centering, and shall form a tight joint free from water leakage and seepage.

6) Pre-cast vault shall meet the requirements of ASTM C 478 except that the minimum compressive strength of the concrete shall be 4000 psi. The maximum individual grade ring height shall be 3 inches. Grade rings shall include steel reinforcement.

7) Each vault section shall be clearly marked inside with the following:
   1) ASTM Designation
   2) Date of Manufacturer
   3) Name or Trademark of Manufacturer

c. Product Handling:

1) No precast unit shall be shipped in less than 7 days from date of manufacturer, unless the unit has been tested and is shown to be in full compliance with the Specifications. Date of manufacture shall be stamped on each unit.

2) Precast sections shall be transported and handled with proper equipment to protect the elements from damage. Sections shall be handled by means of lifting inserts embedded in the concrete.

2. Water Main, Valves and Fittings: As specified in Section 15370.
3. Drain/Backwater Valve: Cast iron construction with square top and round hinged perforated grate and ball type backwater valve; Josam Series 39970 3-inch outside caulk, or equal.
4. Access Hatch, Manhole and Frame, Ladder and Ladder-Up: As described in the Drawings, or approved equal.
5. Granular Bedding shall meet the requirements of AASHTO M 43, No. 57.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Precast vault unit shall be transported and handled with proper equipment to protect the unit from damage. Vault shall be handled by means of lifting inserts embedded in the concrete. Vault shall be new and un-used product, free from defects. Repairs to vault are prohibited, before and after shipment. If vault is damaged as a result of installation it shall be removed and disposed of by the Contractor at no cost to the Owner and not returned to the project site. Damaged vault shall be replaced with new un-used pre-cast vault from the same manufacturer. Injection of grout sealant in the surrounding soils to correct joint leakage is prohibited.

1. Excavation, foundation preparation, backfill, and compaction shall be as specified in Section 02220.
2. Precast vault shall be installed where and as shown on the Contract Documents and Standard Details or as directed by the Engineer.
3. Equipment Installation: For equipment installation see applicable Sections of the Specifications.
4. Refer to Section 15370 for water min disinfection.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface Preparation.

B. Pipe Line Identification Painting.

C. Paint Schedules.

1.02 RELATED SECTIONS

A. Pre-finishing or shop priming requirements as specified in various other Sections of these Specifications.

1.03 QUALITY ASSURANCE

A. Applicator Qualifications: Painting applicator shall submit evidence of acceptability as a qualified applicator by the manufacturer of products specified herein. Submit such evidence with Submittals as specified herein.

B. Applicator shall have minimum five year documented experience in Projects of the type to be undertaken by this Contract.

1.04 REFERENCES

A. Steel Structures Painting Council Surface Preparation Specifications:
   1. SSPC-SP1, Solvent Cleaning.
   2. SSPC-SP6, Commercial Blast Cleaning.
   3. SSPC-SP10, Near-White Blast Cleaning.

1.05 SUBMITTALS

A. Samples: Submit actual sample color chips of standard colors and samples of any intermixes required to match colors indicated in Finish Schedule on Drawings.

B. Schedule and Product Data: Submit paint schedule in same format as the paint scheduled herein, and indicate which of the selected manufacturer's products are

PART 1 - GENERAL

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A. Surface Preparation.

B. Pipe Line Identification Painting.

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1.05 SUBMITTALS

A. Samples: Submit actual sample color chips of standard colors and samples of any intermixes required to match colors indicated in Finish Schedule on Drawings.

B. Schedule and Product Data: Submit paint schedule in same format as the paint scheduled herein, and indicate which of the selected manufacturer's products are intended for use. Do not perform painting or coating work without Engineer's approval of submitted paint schedule.

C. Certificates: Paint manufacturer's direct factory representative shall certify in writing painting and coating compliance with the following:
   1. Factory representative's initial site inspection of conditions pertinent to painting and coating work with Contractor or his authorized painting representative.

2. Factory representative's second site inspection at completion of painting and coating work to check proper application and actual mil thickness compliance with these Specifications.
3. Certification issued to Contractor only following unacceptable painting and coating work being rectified to Contractor's satisfaction.
4. Factory representative shall make his services available to the Contractor for immediate consultation in regard to the painting and coating work, and shall make above stated inspections in the Contractor presence.

D. Operation and Maintenance Data: Upon approval of painting schedule, submit five copies of a detailed maintenance manual including the following information:
1. Name, address and telephone number of manufacturer and local distributor.
2. Product name, number and technical data sheet for each type of paint.
3. Detailed procedures for routine maintenance and cleaning.
4. Detailed procedure for light repairs such as chips, scratches and staining.

E. Maintenance Materials: Turn over to Owner upon completion of the Project a full set of pipe line identification stencils.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver paint materials to job site in their original, sealed containers with labels intact and legible at time of use.

B. Store approved materials at the job site in a suitable and designated area restricted to storage of paint and coating materials and related equipment.

C. Use all means necessary to ensure safe storage and use of paint and coating materials and the prompt and safe disposal of waste. Store paint and coating products protected from weather when such products may be affected by freezing.

1.07 PROJECT CONDITIONS

A. Field and Shop Coat Compatibility: To ensure satisfactory paint and coating performance, it is a Contract requirement that products applied in the shop and field be mutually compatible.
1. Contractor shall require fabricators and equipment manufacturers to apply shop coats that are compatible with field coats specified herein.

B. Painting Factory-Finished Items:
1. Equipment, such as motors, pumps and other such items, which when installed become an integral part of a system and which may be delivered fully factory-finished (that is, having finish coatings in addition to the prime coating) shall not require repainting in the field unless:
a. Factory finish is unacceptable to the Engineer, that is, not having generic type of paint or proper mil thickness to withstand corrosive atmosphere, immersion, severe exposure; or,

b. Factory finish is damaged.

3. On factory-finished items requiring repainting, first sand existing paint to a dull finish and then repaint in scheduled finish system for the installed location of such factory-finished items.
4. Factory finished building structure components, both exterior and interior and fully factory finished general construction products, appliances and panels will not require field painting unless finish is damaged during transportation and installation.

C. Painting Caulking Compound: Do not apply paint over caulking compound until integral solvents have been released from the compound.

D. Color:
1. Paint equipment not furnished with a factory finish, or not finished with an acceptable factory finish, and piping and conduits the same color as adjacent surface.
2. Final work shall match Owner approved samples. Owner shall select colors where not indicated or specified at no additional cost.

E. Placing Into Service: Do not place painted items into service until paints and coatings are fully cured (dry-hard).

F. Environmental Requirements:
1. Adhere to manufacturer's data on air and surface temperature limits and relative humidity during application and curing of coatings.
2. Schedule coating work to avoid dust and airborne contaminants.
3. Apply exterior finishes during daylight hours only.
4. When painting must be done in confined spaces, or because of unfavorable ambient conditions, longer drying times will be necessary.
5. Provide supplementary ventilation such as fans and blowers in confined or enclosed areas to carry off solvents during the evaporation stage.

G. Protection:
1. Protect paint materials before, during and after application, and protect other work and materials with drop cloths or other impervious material.
2. Clean up or otherwise remedy without additional cost, damage by paint and coatings to public or private property.
3. Provide in-place protection for fully factory finished general construction products, appliances and panels.
4. Provide DUST-TIGHT in-place protective covering, or masking, on such items as motors, controls, bearings and similar items which may be damaged internally by the inclusion of blast cleaning debris and dust created by blast cleaning or abrasive blasting operations.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Paint materials listed in the Paint Schedule are products of TNEMEC Company Inc.. Equivalent products of other manufacturers may be acceptable, after award of a Contract, subject to the requirements of Supplementary Conditions Paragraphs SC – 6.05.A through L.

2.02 MATERIALS

A. Surface Preparation Products: Provide those products recommended by coating manufacturer for surface repair and preparation prior to coating with specified Products.

B. Paint: As specified in the PAINT SCHEDULE included in this Section, unless otherwise specified in individual Specification Sections.

C. Thinners: Provide those thinners recommended for that purpose by coatings' manufacturer of material to be thinned.

PART 3 – EXECUTION

3.02 PREPARATION

A. General: Follow paint manufacturer's instructions for surface preparation and repair prior to applying specified coatings.

3.02 RE-PAINT SURFACE PREPARATION

A. The Contractor is responsible for the quality of the repaint work insofar as proper surface preparation will affect finished appearance. Quality of finishes shall be subject to the Engineer's approval or rejection. Recoat work as a result of rejection shall be at no expense to the Owner.

B. Clean surfaces where deposits of wax, grease or oil are present with suitable solvents, followed by washing with alkaline detergent in water solution. Remove alkaline residues by washing the surfaces with fresh water.

C. Prepare previously painted surface where rust, powdering, scaling, peeling or flaking is present by wire brushing, scraping and sanding to solid material. Sand solid edges smooth.

D. Prepare areas to be repainted, and hard, glossy surfaces, for paint adhesion, by sandpapering, followed by surface washing and rinsing. When a de-glosser is used, the washing and rinsing may be omitted.

E. Patch- test unknown old coatings for compatibility.

3.03 APPLICATION

A. General:
   1. Follow paint manufacturer's label instructions for mixing, thinning, proper spreading rate and drying time. In no case shall film thickness be less than manufacturer's recommendations nor shall area coverage per gallon exceed manufacturer's recommendations.
   2. If material has thickened or must be diluted for application, the coating shall be built up to the same film thickness achieved with undiluted material. Do not use thinner to extend coverage of the paint.
   3. Regardless of the surface, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.

B. Method of Application:
   1. Workmanship: In general, finished surface regardless of method of paint application shall show no evidence of improper application according to accepted trade practice. Do not use paint rollers having nap exceeding 3/8 inch.
   2. Multi-Coat Application:
      a. Succeeding coats of paint shall show visual difference from Preceding coats. Each coat shall have a uniform appearance and be tinted to the final coat. The final coat shall present solid hiding with edges of paint adjoining other paint or materials made clean and sharp without overlap. Wipe or otherwise render undercoats dust free just prior to application of succeeding coatings.
      b. Do not apply additional coats of paint until the film to be recoated is sufficiently cured to receive the next coat.
      c. If the time limit is exceeded for coatings that have a maximum recoat time, consult paint manufacturer before proceeding with next coat.

C. Painting Exposed/Concealed Surfaces:
   1. It is a requirement of this specification that all exposed interior and exterior surfaces be painted unless otherwise specified in this Section or elsewhere in the Project Manual. **Exterior surfaces include, but are not limited to electrical cabinets and conduits and other non-architectural elements, which shall be painted in a color to match that of the surface to which they are attached.**
   2. In interior exposed areas of structures, including pipe chases, paint mechanical systems, including pipes, fittings, and conduit systems, except for full factory finished items as defined previously.
   4. Paint interior exposed items the same color as adjacent wall/ceiling color. Paint pipes and in-line valves, meters, and other appurtenances with colors as specified in this Section or as directed by Engineer.
   5. Do not paint exposed aluminum surfaces.

D. Pipe Line Identification:

1. After finish painting, mark non-submerged piping with an applicable color band bearing the stenciled name of its contents. Identify piping at valves and fittings, on piping both sides of walls and floors where pipes pass through same and on long pipe runs approximately every 30 feet or closer when directed.
2. Also adjacent to the color band, stencil the pipe size and an arrow indicating direction of flow in the pipe. Color pipe size identification and flow arrow the same as the lettering.
3. Place legend, pipe size and flow arrow in location so that it can be easily read from the floor.
4. Where pipes are adjacent to each other, arrange legends neatly in line.
5. Use gothic style lettering with letter size and color band width in accordance with the following table:

Pipe Outside Diameter	Color Band Width	Letter Size
3/4" to 1¼"	8"	1/2"
1½" to 2"	8"	3/4"
2½" to 6"	12"	1¼"
8" to 10"	24"	2½"
Over 10"	32"	3½"

6. Identify pipe lines less than 3/4" outside diameter with brass or aluminum tags.
7. Colors shall be selected by the Engineer prior to start of painting work from manufacturer's full range.

3.03 CLEANING

A. Upon completion of work, remove paint and coating spots, oil and grease stains from floors, walls, fixtures, hardware and equipment, leaving their finishes in a satisfactory condition. Remove materials and debris from the site of work, and leave in a clean condition so far as this work is concerned.

B. Keep site free from accumulation of paint containers, solvents, thinner and used cleaning cloths and legally dispose of same off premises daily.

3.04 PAINT SCHEDULE

A. General: Owner shall select painting system from the Schedule and the color for such surfaces, items, apparatus, materials or equipment not specifically named herein, but requiring paint according to the Owner's direction in the field.

1. Contractor shall provide repair/resurfacing products required prior to applying first coat of paint as specified in the coating Products' specifications or recommended by manufacturer.

B. Metal Surfaces:

		Dry Film-Mils
Surface Preparation:	SSPC-SP6 Commercial Blast Cleaning	
First Coat:	66-1211 Epoxoline Primer	3.0 - 5.0
Second Coat:	66-Color Hi-Build Epoxoline	4.0 - 6.0
		7.0 – 11.0

END OF SECTION

SECTION 11200

BASIC EQUIPMENT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Basic equipment requirements specifically applicable to Sections of Divisions 11 and 13 unless otherwise noted in those Sections.

1.02 RELATED SECTIONS

A. Scope of Work: Section 01010.

B. Submittals: Section 01300.

C. Equipment, Systems and Facility Start-up: Section 01650

D. Contract Closeout: Section 01700.

E. Painting: Section 09900.

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: The construction requirements of State, County, or other political subdivision specifications exceeding the requirements of the codes, standards and approving bodies referenced herein shall be met and complied with.
   1. Both the Underwriters' Laboratories (UL) Listings and Approvals and the National Electrical Manufacturers' Associations (NEMA) stamps or seals shall be evidenced where applicable to electrical apparatus forming parts of the "mechanical" equipment.
   2. Electrical Control panels shall be constructed in accordance with the requirements of the Underwriters Laboratory, or other nationally recognized certification agency and shall be appropriately labeled.

B. Certificates and Permits: Upon completion of work, and prior to final Payment, furnish to the Engineer formal certification of final inspections from authorities having jurisdiction and secure required permits, if any, from same. Additionally, prepare detailed diagrams and drawings which may be required by those authorities having jurisdiction.

1.04 SUBMITTALS

A. Shop Drawings and Product Data: Submit in compliance with Section 01300.
   1. Submit for approval completely dimensioned shop, layout or setting drawings and catalog cuts or other data as required to provide a complete description of system equipment specified in each Section of Divisions 11 and 13.
   2. Submit shop drawings certified for construction by the manufacturer and approved by the Contractor which includes location of electrical connections; wiring diagrams; anchor bolt layout; details indicating construction and materials of construction; diameter of shafting; dimensions and rated horsepower of all motors; gear and bearing ratings; service factors and weights of principal parts and completely assembled equipment.

B. Operation and Maintenance Manuals: Submit in compliance with Section 01700. Submit to the Engineer for review and approval, manuals prepared by the manufacturer/supplier, or the Contractor. The submission and approval of each set of manuals will be considered to be an integral part of furnishing and installation of the respective equipment or system. The Contractor will be informed if manuals submitted are incomplete and will supply the information necessary for completion. Each manual shall be supplied with a Table of Contents and subjected matter should be indexed categorically.
   1. Include the following elements in each manual:
      a. Erection or installation instructions.
      b. Start-up procedures.
      c. Recommended and alternative procedures.
      d. Schedule of preventive maintenance requirements.
      e. Schedule of recommended spare parts to be stocked, complete with part number, inventory quantity and ordering information.
      f. Detailed maintenance procedures.
      g. Schedule of lubrication requirements.
      h. Corrected and approved control and wiring diagrams.
      i. Data sheet listing pertinent equipment or system information, as well as the addresses and telephone numbers of the nearest sales and service representatives.

1.05 DELIVERY, STORAGE AND HANDLING

A. When unloading materials, equipment and machinery provide special lifting harness or apparatus as may be required by manufacturers. Handle materials, equipment and machinery in accordance with manufacturer’s written instructions.

B. Store Products, both on- and off-site, in accordance with manufacturer's written instructions. Additionally, provide manufacturer's certificates of proper materials, equipment or machinery storage for the following listed items. Prior to issuance of such certificates, a manufacturer's representative shall visit the site of storage and examine materials, equipment or machinery in actual storage conditions.

C. When transporting Products, both on-site and from Contractor's storage to the site, do so in accordance with recommendations of the respective manufacturers of each.

1.06 PROJECT CONDITIONS

A. Electrical Interface: As specified in Section 01010.

B. Field and Shop Coat Compatibility: To ensure satisfactory paint and coating performance, it is a Contract requirement that products applied in the shop and field be mutually compatible.
   1. Contractor shall require fabricators and equipment manufacturers to apply shop coats that are compatible with field coats specified herein.
   2. Above requirement does not apply to full factory-finished items, that is, items having both primer and final finish coatings, except as specified in Section 09900.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Chemicals or materials which may come in contact with or affect the quality of water and are used in the construction, treatment processes, containment or conveyance of public water supply systems shall be certified for conformance with ANSI/NSF Standards 60 & 61.

B. Submit certificate of conformance with ANSI/NSF Standard 60 & 61 with product data submittals in accordance with Section 01300.

1.08 WARRANTIES

A. Assigned Warranties: Manufacturer's warranties on material and equipment (including internal components) exceeding the guarantee time period as stated in the Conditions of the Contract, shall be assigned directly to the Owner.
   1. Such assigned warranties shall be dated to begin on the date of the Owner's acceptance of the Work, but not earlier than the date of Substantial Completion.
   2. Submit warranties along with submission of Shop Drawings and Product Data.
   3. Insert approved warranties in the approved Operation and Maintenance Manuals after the date of Substantial Completion has been established.

B. **Warranties which begin prior to the date of Substantial Completion are not acceptable. When manufacturers' warranties begin on the date of delivery, or any date earlier than the date of Substantial Completion, Contractor shall purchase**

extended warranties which shall provide coverage at least for the entire Correction Period. Cost for extended warranties shall be included in the Contract Price.

C. Refer to Section 01750 – WARRANTIES for additional information on warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A General: Submittals for Substitutions or "Equal" Products or methods may be acceptable after award of the Contact in accordance with Supplementary Conditions Paragraphs SC—6.05.A through SC-6.05.L, and subject to Engineer's approval.

1. For each category of materials and equipment (Products), provide Products of the same manufacturer and type.

B. Shop Paint: For primer coat use only those primers that are compatible with field coats specified under Sections 09900 and 09901.

C. Pressure Gauges: Combination pressure gauges shall have a built-in pressure snubber and 4-1/2 inch minimum diameter faces and be turret style, black phenolic case with clear glass face. The movement shall be rotary, of 400 Series stainless steel with teflon coated pinion gear and segment. The gauge shall be bottom connected & accept a 1/4" NPT female thread. Combination pressure gauge range and scale graduations shall be in psi and feet of water as follows:

1. Suction Pressure: 0 to 100 psi, 10 psi figure intervals, with graduating marks every 1 psi (0-230 feet).
2. Discharge Pressure: 0 to 200 psi, 20 psi figure intervals, with graduating marks every 2 psi (0-460 feet).
3. All gauges will be panel mounted off the pipeline and be flexible connected to their respective sensing point. The gauge trim tubing shall be complete with both isolating and vent valves and the tubing shall be so arranged as to easily vent air and facilitate gauge removal. Gauges mounted directly to the pipeline or at the sensing point will not be accepted.
4. Gauges shall be Ashcroft Duragauge Plus Model 1279XLL.

C. Motors:

1. Provide motors of sufficient capacity to operate the given equipment under all conditions of operation without loading beyond the nameplate current or power.
2. In no case are motors offered to be less than the horsepower specified except when it can be demonstrated that because the efficiency of the driven equipment is greater than that specified, a lesser horsepower will suffice.
3. Design motors one-half horsepower and larger to operate on 480 volt, three-phase, 60 Hertz current unless otherwise specified.
4. Design motors smaller than one-half horsepower to operate on 120 volt, single-phase, 60 Hertz current unless otherwise specified.
5. Provide motors of drip proof, energy efficient ball bearing type unless otherwise specified.

6. Design motors to operate in an ambient temperature of 40°C in continuous operation with a service factor of 1.15.
7. Provide totally enclosed fan cooled motors where motors are located outdoors.
8. All motors shall comply with Standards of IEEE and NEMA in all respects except where requirements exceed these Standards.
9. Provide vertical motors with thrust bearings adequate for axial loading to which they can be subjected in operation.
10. Bearings for motors one-half horsepower and larger shall be rated for 20-year life under AFBMA Standards.

D. Equipment Anchors: Provide anchors for equipment requiring such. Size anchors for embedding in concrete and sleeve anchors as recommended by equipment manufacturers. When recommendations are not provided, size anchors in the largest diameter that will pass through the bolt holes in equipment bases. Anchor lengths as indicated on Drawings.
   1. Stainless Steel Anchor Bolts: ASTM A320 Grade B8, AISC Type 304.
   2. Expansion Anchors: Conforming to Federal Specification FF-S-325, Group II, Type 4, Class 1 Stainless Steel; such as Hilti Kwik-Bolt, Phillips Red Head Wedge-Anchor and Molly Parabolt, or equal.

E. Spare Parts: Include the cost of spare parts in the Contract Price.
   1. Provide manufacturer's recommended spare parts for each piece of mechanical equipment listed in each section.
   2. Package each part individually or in sets in moisture-proof wrappings or vacuum packaging. Bulk packaging of dissimilar parts is not acceptable. Each package shall be clearly labeled to indicate the following information:
      a. Name of equipment that spare part is for.
      b. Spare part name.
      c. Manufacturer's part/stock number.
   3. Submit, in writing, storage procedures for spare parts to provide for proper handling and protection after delivery to job site.
   4. Provide a list of all equipment and tools needed to maintain and calibrate each piece of mechanical equipment.
   5. The Contractor shall store all spare parts in a secure off-site location until a certificate of substantial completion is issued for the product and in the Engineer's opinion, the spare parts can be properly stored at the project site. The Contractor shall, at the Engineer's or Owner's request, allow for inspection and verification that the spare parts are being properly handled and stored in accordance with the equipment manufacturer's written instructions.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment with skilled mechanical erection labor in accordance with manufacturer's instructions.

B. Installed equipment shall be inspected, adjusted, approved and certified satisfactory by the manufacturer.

C. Furnish the Engineer with manufacturer's certificates regarding equipment installation prior to initial mechanical performance tests.

D. Shop Painting:
   1. Prior to painting remove all rust, dust and scale as well as other foreign substances on ferrous metal surfaces to be prime painted in the shop, by sand-blasting or pickling.
      a. Blast-Cleaning shall conform to requirements of the latest edition of SSPC-SP6, Commercial Blast Cleaning.
      b. Pickling shall conform to requirements of the latest edition of SSPC-SP8, Pickling, or SSPC-SP10.
   2. The ferrous metal surfaces thus cleaned shall be prime painted as soon as possible after cleaning to prevent new rusting.
   3. All ferrous metal surfaces of equipment, apparatus, and devices shall receive a shop coat of primer (except acceptable factory-finished surfaces) unless otherwise specified or required by the Engineer.
   4. Painting:
      a. Apply shop paint in accordance with SSPC-PA1.
      b. Minimum dry mil thickness at 1.5 to 2 mils.

E. Field Painting: As specified in Sections 09900 and 09901.

3.02 FIELD QUALITY CONTROL

A. Equipment and systems start-up as specified in Section 01650.

B. Operating Costs:
   1. Costs for Initial Operation and Mechanical Performance Tests: Include in the Contract Price the following operating costs for satisfactorily completing the Initial Mechanical Performance Tests on equipment being tested. Owner will provide and pay for water and chemicals needed for test.
      a. Electrical power.
      b. Lubricating grease.
      c. Lubricating oils.
      d. Such other materials or utilities not specifically identified herein, but required to conduct the Initial Mechanical Performance Tests
   2. Costs for Final Mechanical Performance Tests: Owner will pay operating costs for the Final Mechanical Performance Tests.

END OF SECTION

SECTION 13320

INSTRUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Level Instruments:
   1. Level Transmitter Probe (Valve Vault)
   2. Valve Vault Hatch Intrusion Sensor

1.02 RELATED SECTIONS

1. Basic Equipment Requirements: Section 11200

2. Instrumentation components or apparatus provided integral with or furnished as part of the products or systems under other Specification Sections will be provided as work of those Specification Sections.

1.03 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. IEEE C37.90 - Relays and Voltages in Low-Voltage AC Power Circuits.
   2. IEEE C62.41 - Surge Voltages in Low-Voltage AC Power Circuits.

B. Instrument Society of America (ISA):
   1. ISA S20 - Specification Forms for Process Measurement and Control Instrumentation.
   2. ISA S50.1 - Compatibility of Analog Signals for Electronic Industrial Process Instruments.

1.04 SYSTEM DESCRIPTION

A. Provide instruments which operate on 115V AC ±10 percent, 60 Hz power, unless indicated otherwise, and which return automatically to accurate measurement upon restoration of power after a power failure, except where specifically noted.

B. Provide open and short circuit protection except for two-wire transmitters.

C. Provide all instruments with conformably-coated printed circuit boards to prevent damage by dust, moisture, fungus, and airborne contaminants.

D. Provide instruments complete with stainless steel mounting hardware, wall brackets, or instrument racks. Provide Stamped metal tags with ISA identifier on the element and the transmitter (Examples FIT-101, FE-101) for all Instruments.

E. Provide instrument enclosures rated for the environment.

F. Provide surge protection, including power and signal and digital communications protection.

G. Provide a disconnect switch for each instrument at each instrument location, housing shall be as shown on the drawings.

H. Provide all equipment specified herein along with all auxiliary equipment, components, and devices necessary to achieve the functional intent of the instrumentation and control operations.

I. All instruments that have a digital interface shall be provided with software for all HMI (Human Machine Interface) PC's (Personal Computers). The software shall include the porting of all process, configuration, and instrument health status up to the HMI level for viewing information and changing instrument parameters. Software shall be licensed to the Owner.

1.05 QUALITY ASSURANCE

A. Ensure that the instrumentation system is functionally integrated and operationally complete by obtaining the system equipment and components, which may be products of different manufacturers, from one System Supplier in whom the responsibility for the entire instrumentation system is vested.

B. Provide instrumentation of rugged construction designed for the Project site conditions.

C. Provide only new, standard, first-grade materials throughout, conforming to standards established by Underwriters Laboratories (UL), FM, or CSA as required by local codes, if any, except as modified by the Specifications and so marked or labeled, together with manufacturer's brand or trademark.

D. Flow and pressure instrumentation shall be factory calibrated on an approved test stand with certified accuracy traceable to NIST, compliant with the applicable ISO standard and third party accreditation by a national verification agency.

E. Unless specified otherwise, use single-source manufacturer for each instrument type regardless of installation location or classification.

F. Document all instrumentation in accordance with Instrument Society of America (ISA) Standard, ISA-S5.1-2009.

G. Furnish and install replacement parts for any defective component at no additional cost. Replace spare parts consumed during the warranty period with new equipment immediately after use to restore the spare parts inventory.

1.06 SUBMITTALS

A. Shop Drawings and Product Data: Submit information in conformance with provisions specified in Section 11200.

B. Include the following information:
   1. Operation and maintenance manuals for each instrument.
   2. Submit certification by the Systems Supplier as to the proper installation of all instruments.
   3. Where model selected is not the basis of design, submit all related equipment and installation changes to electrical and mechanical drawings, that will permit complete review of the instrumentation and equipment. Provide proof of equal operation as intended.

C. For each instrument specified, include the following information:
   1. Component manufacturing data sheet indicating ratings, performance, size, weight, and energy requirements. Clearly identify each component by item number and nomenclature referencing the Drawings and Specifications.
   2. Complete Interconnection diagram showing wiring terminals, wire identification routing, and all items to be interfaced.
   3. Mounting details and installation hardware.
   4. List of recommended spare parts.

D. Exceptions to the Specifications or Drawings shall be clearly defined by the Contractor.

E. Submittals shall be reviewed with respect to their conformance with the Contract Documents. Unless provided for reference or clarification of unspecified items, submittals which do not address specific Specification items will not be acceptable. Highlight each item or note specifically which items are omitted. Highlight individual components that make up complete catalog numbers.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Have each manufacturer or supplier securely attach the tag number and instructions for proper field handling and installation to each instrument prior to packaging.

B. Have each manufacturer or supplier package instrumentation to protect against shipping damage, dust, moisture, and atmospheric contaminants. Include a shipping label which contains the following information.
   1. Tag number and description.
   2. Instructions for unloading, transporting, storing, and handling at the site.

C. Receive instrumentation at the site. Inspect instrumentation for damage in shipment and return damaged instrumentation to the manufacturer.

D. Do not store instrumentation out of doors. Provide dry, permanent storage facilities and pay storage costs.

1.08 WARRANTY

A. Refer to Section 11200 for detailed Warranty requirements.

B. Warranty the instrumentation Products, workmanship and installation to be free from defects for a period of one year from the date of Substantial Completion.

B. Provide replacement parts for any defective component at no additional cost. Replace spare parts consumed during the warranty period with new equipment immediately after use to restore the spare parts inventory.

PART 2 - PRODUCTS

2.01 LEVEL INSTRUMENTS

A. Flood Water Detection (Valve Vault):
   1. Refer to the Contract Drawings for Size, Quantity, Location, and mounting.
   2. Conductance actuated single-level service, 120 VAC operation to low voltage on the probes, 316 SS probes, normally open contact which closes on contact with water, SPDT 10-amp output contacts, NEMA 4 enclosure, kick and bump protected probes mounted 1/8" above the floor level, walkway, vault floor, etc. as applicable.
      a. General Applications: 316 SS probes.
   3. Acceptable Manufacturers:
      a. Ametek - B/W Controls, Model 6012-SS-X-6B-1.
      b. Warrick Controls.
      c. Or Equal.

2.02 VALVE VAULT HATCH INTRUSION SENSOR

A. Capacitive Proximity Switch and Mounting Bracket
   1. Refer to the Contract Drawings for Size, Quantity, Location, and mounting
   2. Plastic Face/Threaded or Smooth Plastic Barrel, Adjustable sensing distance 2-wire operation, 2 conductor connection, 120…240V AC, normally open output, transient noise protection
   3. Acceptable vendors:
      a. Allen Bradley
      b. Balluff
      c. Or Equal

2.03 ACCESSORIES

A. Process Display Meter:
   1. Digital panel meter with 4½-digit plus extra zero, 1.0" high red LED display; two front panel operable buttons; accepts 4-20 mA, 0-5 VDC, 1-5 VDC, and 0-10 VDC and displays in engineering units; two isolated 24 V power supplies to drive both the input and output loops; isolate 4-20 mA output if required; 120 VAC input power; NEMA 4X enclosure.
   2. Use if needed for display at panels and where required by plans.
   3. Acceptable Manufacturers:
      a. Precision Digital Model PD655.
      b. Pepperl+Fuchs.
      c. ABB.
      d. Honeywell.
      e. Or Equal.

B. Surge Protection for Instruments:
   1. Provide surge protection and power disconnect for instrumentation shown on Contract Drawings. The Contractor shall provide a tag identifying the panel and breaker source for load to instrument and place tag on each surge protector. Transient voltage surge protectors (TVSS) or surge protection devices (SPD) shall be one in the same and designated SPD.
   2. Communication and data SPDs – pluggable analog and digital I/O:
      a. SPDs for 24 V and 110 V circuits shall be UL 497B listed or recognized.
      b. SPDs shall consist of a multi-stage hybrid circuit with staging inductors or resistors to properly coordinate the components.
      c. Surge protection for Division 1 hazardous area locations will conform to EN 56 020/DIN EN 50 020/VDE 0170/0171 Part 7: 1996-04. Surge protection for hazardous areas shall have at least 500 V isolation between intrinsic safety ground and earth ground.
      d. Surge protection plugs used for high speed data communications shall not have a cutoff frequency less than 100 MHz for a 50 ohm system.
      e. Surge protection for 5 to 24 V analog or discrete I/O shall be designed to withstand a maximum 10 kA test current of a 8/20 μs waveform according to IEC 1024 Application Guide A and IEEE C62.41.1-2002 Category C area and 2.5 kA test current of a 10/350 μs waveform according to IEC 1024 Application Guide A and by IEEE C62.41.2 Appendix A. Surge protection for I/O (60 VAC – 230 VAC) shall be designed to withstand a maximum 6.5 kA 8/20 μs test current.
      f. Operating temperature range shall be at least –40ºC to +80ºC.
      g. Base options shall include models with either:
         1) A direct electrical connection between ground terminal and DIN rail, or
         2) A gas discharge tube between ground terminal and DIN rail.
      h. SPD plugs for analog, discrete, and data circuits shall be testable via a portable device. The tester shall be a single unit capable of diagnosing the plug status once model information is entered via a peripheral device such as

a keypad, bar code scanner, etc. Results shall be exportable to an external device such as a printer/PC for historical recordkeeping.

i. Acceptable Part Numbers for Pluggable Communication and Data SPDs include:
   1) For analog signals, DIN rail mounted, 5-20 VDC and 12-110 VAC: Phoenix Contact Model PT 2x2 (one plug and base required to protect two analog loops), OR Model PT 1x2 (one plug and base required to protect one analog loop).
   2) For digital signals (discrete), DIN rail mounted, 5-24 VDC: Phoenix Contact Model PT4x1 (one plug and base required to protect four digital signals, OR Model PT 2x1 (one plug and base required to protect two digital signals).
   3) For discrete signals, DIN rail mounted, 60-230 VAC non-isolated cards (shared returns): Phoenix Contact Model PT 2x1 VA (one plug and base required for every two discrete signals).
   4) For discrete signals, DIN rail mounted, 60-230 VAC isolated cards (one return for each I/O): Phoenix Contact Model PT 2-PE/S (one plug and base for each pair of signal wires, L-N).
   5) For high speed data bus signals, DIN rail mounted, 5-48 VDC: Phoenix Contact Model PT 3-HF (one plug and base required to protect a two-wire data signal, OR Model PT 5-HF (one plug and base required to protect a four-wire data signal).
   6) For analog signals, DIN rail mounted, in Division 1 hazardous area locations, 24 VDC: Phoenix Contact Model PT 2xEX(1)–24DC (one plug and base required for two analog loops or four digital signals).

3. Communication and data SPDs – non-pluggable/high density analog and digital I/O:
   a. Surge protection shall consist of a multi-stage hybrid circuit with staging inductors or resistors to properly coordinate the components. Series resistance shall not exceed 4.7 ohms (±10%).
   b. Surge protection for analog and digital I/O shall be designed to withstand a 5 kA test current of an 8/20 μs waveform according to IEC 1024 Application Guide A and IEEE C62.41.1-2002 (Line to Ground). Surge handling capability of Line 1 plus Line 2 shall be 10 kA of 8/20 μs waveform.
   c. Operating temperature range shall be at least –40ºC to +85ºC.
   d. Maximum load current through the surge protection module shall not exceed 250 milliamps for analog and digital signal protection.
   e. Cutoff frequency for analog modules shall be 3 MHz for a 50 ohm system and 1 MHz for a 150 ohm system. Cutoff frequency for digital modules shall be 2 MHz for a 50 ohm system and 600 KHz for a 150 ohm system.
   f. Ex-I modules shall contain only diode and gas tube (no MOV) and shall be isolated from ground by 500 VDC as required by EN 50 020.
   g. Acceptable part numbers for non-pluggable/high-density communication and data SPDs include:
      1) For analog signals, DIN rail mounted, 24 VDC: Phoenix Contact Model TT-2-PE-24DC.

2) For digital/discrete signals, DIN rail mounted, 24 VDC: Phoenix Contact Model TT-2/2-24DC.
3) For analog signals, DIN rail mounted, in Division 1 hazardous area locations, 24 VDC: Phoenix Contact Model TT-EX(I)-24DC.

4. Protection for Ethernet, token ring, CDDI (FDDI) data interfaces:
   a. The surge protection device shall have RJ45 sockets for both input and output connections.
   b. A separate connection line marked with "ground" shall be provided as part of the surge protection device housing.
   c. The protection circuit shall have fine protection diodes between all the signal wires, as well as coarse protection between shield and ground.
   d. Surge protection device shall have an operating temperature range of at least –40ºC to +80ºC.
   e. The maximum continuous operating voltage from signal to ground shall be ±7 VDC.
   f. The nominal discharge surge current IN (8/20) µs shall be at least 350 A signal to signal and 2.5 kA signal to ground.
   g. The input attenuation aE (symmetrical) in a 100 ohm system shall be not higher than 1 dB up to 100 MHz.
   h. The cutoff frequency fg (3 dB) (symmetrical) in a 100 ohm system shall be ≥100 MHz.
   i. Acceptable part numbers for Ethernet, token ring, CDDI (FDDI) data interface SPDs include:
      1) For DIN rail mounted version: Phoenix Contact Model D-LAN – CAT5.E-U.
      2) For inline connected protection adapter: Phoenix Contact Model D-LAN-CAT5.E.
5. Communication and data SPDs – field mount, protection for analog signals (conduit mount):
   a. Surge protection for analog signal protection shall consist of a multi-stage hybrid circuit utilizing only diodes and gas discharge tubes but no metal oxide varistors (MOVs).
   b. Surge protection for analog and digital I/O shall be designed to withstand a 10 kA test current of a (8/20) µs waveform according to IEC 1024 Application Guide A and IEEE C62.41.1-2002 Category C Area.
   c. Surge protection shall not have more than 10 ohms of series resistance.
   d. Surge protection shall have a response time less than 1 µs.
   e. Maximum operating voltage shall not exceed 28 VDC.
   f. Surge protection shall not have a cutoff frequency less than 400 kHz (for a 600 ohm system) to allow HART protocol and other superimposed smart digital signals to function.
   g. Surge protection module shall have an operating temperature range of at least -40ºC to +65ºC.
   h. Maximum load current through the surge protection module shall not exceed 250 mA.
   i. Acceptable part numbers for conduit mounted analog signal SPDs include:

1) For analog signals, conduit mounted, 24 VDC: Phoenix Contact Model S-PT1-2PE-24DC.

6. Communication and data SPDs – field mount, protection for four-wire field devices (N4X enclosure mount):
   a. Surge protection for four-wire field devices shall include an SPD for protecting the analog signal and a separate SPD for protection the 120 VAC power. Both SPDs shall be self-contained in one NEMA 4X enclosure suitable for mounting outdoors.
   b. Each SPD for the four-wire protection system shall be designed to withstand a 10 kA test current of a (8/20) μs waveform according to IEC 1024 Application Guide A and IEEE C62.41.1-2002 Category C area.
   c. Surge protection shall not have more than 10 ohms of series resistance.
   d. Surge protection shall have a response time less than 1 μs.
   e. Maximum operating voltage shall not exceed 28 VDC for the analog SPD and 130 VAC for the power SPD.
   f. Acceptable part numbers for NEMA 4X four-wire field mount SPDs include:
      1) Phoenix Contact BXT-N4X 4-wire.
7. Coaxial Cable SPDs:
   a. Surge protection shall be available with either a "BNC", "N", "7/16", or "F" connector to mate with the appropriate coaxial cable.
   b. Surge protection module shall have an operating temperature range of at least –20ºC to +80ºC. Quarter wavelength (λ/4) filters shall have an operating temperature of at least –40ºC to 100ºC.
   c. Nominal current ratings for the various connector types shall be at least: 3.5 amps for "BNC" connectors, 5 amps for "N" connectors, 2 amps for "F" connectors. λ/4 filters shall be capable of up to 500 W power at 2 GHz.
   d. Cutoff frequency (3 dB) for the various connector types shall be at least: 1 GHz in 50 ohms system for "BNC" connectors, 3 GHz in 50 ohm system for "N" connectors, 1 GHZ in 75 ohm system for "F" connector. λ/4 filters shall have less than 0.2 dB input attenuation between 1.7 and 2.3 GHz.
   e. Surge current capability (8/20) μs waveform according to IEC 1024 Application Guide A for the various connector types shall be at least: 5 kA for "BNC" connectors, 20 kA for "N" connectors, 330 A for "F" connectors. λ/4 filters shall handle up to 20 kA.
   f. Acceptable part numbers for coaxial cable SPDs include:
      1) For "BNC" connectors: Phoenix Contact C-UB/E.
      2) For "N" connectors: Phoenix Contact CN-UB-280DC-SB.
      3) For "F" connectors: Phoenix Contact CF-TV 30DC-BB-U.
      4) For "λ/4" filters: Phoenix Contact CN-LAMDA series.
8. The surge protectors shall be Phoenix Contact, Inc., P. O. Box 4100, Harrisburg, Pennsylvania 17111, telephone: 717-944-1300, or equal.

C. Power Supply:
   1. Function: Provides the DC voltage to drive required number of standard 4-20mA, two-wire, current loops.
   2. Requirements:

a. Output Voltage: 24VDC +/-5%
b. Output Current: XXmA @ 24VDC (short-circuit protection)
c. Power: 120VAC +/-10%
3 Watts typical, 5 Watts max.
d. Regulation:
1) Line: Within 1%
2) Load: Within 1% to rated current
3) Ripple: Less than 15mV peak-to-peak

3. Plug-in socket.
4. Acceptable Manufacturers:
a. Phoenix Contact.
b. Lutze.
c. Red Lion.
d. Or Equal.

2.04 SHUTOFF AND BLEED VALVES

A. Provide a stainless steel, quarter-turn ball valve between the process line and instrument for water shutoff when the instrument must be removed.

B. Provide a bleed valve between the above ball valve and the instrument to purge the line of air, and to drain the line prior to removal of the instrument from the line.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the Drawings for placement of equipment. The installation details show general intent. They are not to scale. Secure and utilize equipment mounting details from the manufacturer or supplier for installation purposes.

B. The minimum time (day is defined as 8 work hour day, on-site time, excluding travel time) allotted for installation assistance, inspection, calibration, and instruction by factory representatives for each instrument type shall be as follows:
1. Each instrument type – 2 days.
a. Installation on-site support – 1-day.
b. Final inspection and calibration on-site: ½ -day.
c. Training on-site: ½ -day

C. The Engineer shall be notified 10 days in advance of all visits in writing. Failure to notify the Engineer shall be justification for requiring additional visits at no cost to the Owner. The manufacturer shall be responsible for all calibration equipment and consumables.

E. Each manufacturer's representative shall inspect the installation of each of her/his instruments, and shall issue an installation certificate to the Owner and the Engineer for

each instrument certifying that the instrument has been installed in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

A. General:
   1. Provide labor, materials, tools, test equipment, supplies, services, and auxiliary devices including, but not limited to, brackets and mounting hardware to install the equipment.
   2. Install the equipment and auxiliary devices to be accessible for maintenance.
   3. Follow equipment manufacturers' installation specifications.
   4. Vendor shall provide manufacturers' installation details and requirements.
   5. All mounting hardware shall be stainless steel.
   6. Verify all ground connections have been installed according to the Manufacturer's recommendations.
   7. Work with system integrators and provide all parameters and interface, in either hardware or software, as required to flawlessly communicate with other devices to which connected.

B. Remove shipping stickers, paint splatters, dirt, grease, and other contaminants prior to final acceptance.

3.03 FIELD QUALITY CONTROL AND DEMOSTRATION

A. Provide the services of a manufacturer's representative for installation assistance, field calibration, start-up, and training. All instruments shall be calibrated in the field by manufacturer's factory-trained personnel. Cost of services shall be included in the Contract Price.

B. Perform facility start-up, demonstration and training in compliance with Section 01650 – Equipment, Systems and Facility Start-Up.

C. All training shall be performed by a representative from the manufacturer and shall be specific to the instruments provided. Training shall include theory of operation, maintenance requirements, calibration methods, and function of instrument in process control system. Provide course material for five personnel.

D. Performance Test: Furnish special tools, calibration equipment, and labor required to perform tests. Demonstrate that each instrument performs as specified. Test analog devices 0, 25, 50, 75, and 100 percent of scale. All tests shall be performed in the presence of the Engineer.

E. Provide a calibration certification sheet for each instrument requiring such. Each calibration certification sheet shall include the following information:
   1. Project name.
   2. Description.

3. Manufacturer.
4. Model and serial number.
5. Date, time, and person who performed calibration.
6. Calibration data shall include:
    a. Input, output and error at 0 percent and 100 percent of span for analog instruments.
    b. Switch setting, contact action and deadband, if applicable, for discrete elements.

END OF SECTION

SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Basic mechanical requirements specifically applicable to Division 15 Sections.

1.02 RELATED SECTIONS

A. Scope of Work: Section 01010.

B. Submittals: Section 01300.

C. Project Closeout: Section 01700.

D. Painting: Section 09900.

E. Basic Materials and Methods: Section 15050.

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with construction requirements of State, County, and such other local political subdivision specifications as may exceed the requirements of the codes, standards, and approving bodies referenced herein.
   1. Comply with requirements of the National Fire Protection Association (NFPA) Standards referenced in the various Specifications Sections, and as directly appropriate to the work and workmanship.
   2. Comply with requirements for both the Underwriters' Laboratories, Inc. (UL) Listings, Labels, and Approvals and the National Electrical Manufacturer's Associations (NEMA) Stamps or Seals as applicable to electrical equipment or apparatus forming parts of the Mechanical Equipment.

B. Certificates and Permits: Upon completion of work, and prior to final payment, furnish formal certification of final inspections to the Engineer from authorities having jurisdiction and secure required permits, if any, from such authorities. Additionally, prepare detailed diagrams and drawings which may be required by those authorities having jurisdiction.

C. Source Quality Control: Products used throughout these specifications, and as indicated on the drawings, are those of companies having established reputations in the manufacture of the particular materials, equipment, or apparatus specified. Such products may be of their own make, or products of others for which they assume full responsibility when used in said outfits (which are not manufactured completely by them), and with replacement parts available.

D. Workmen's Qualifications: In acceptance or rejection of completed work, no allowance will be made for lack of skill on the part of the Contractor's forces performing such work.
   1. Provide certified pipe welder(s) capable of welding in accordance with ANSI B31.1, Power Piping (Pressure Piping). Show proof of certification when requested by the Engineer.

1.04 SUBMITTALS

A. Product Data: In compliance with Section 01300.
   1. Include in submittals manufacturer's descriptive literature, product specifications, published details, performance/capacity rating schedules or charts and installation instructions, all as applicable to items listed under Submittals in each Section of Division 15; and such items as may be Scheduled on the Drawings.

B. Shop Drawings: In compliance with Section 01300.
   1. Submit for approval completely dimensioned shop, layout or setting drawings, descriptive literature including specifications and details, or other data as required to provide a complete description of systems and equipment specified in each Section of Division 15.
      a. Submit shop drawings certified for construction by Product manufacturers, and approved by the Contractor, which include location of electrical connections; wiring diagrams; anchor bolt layout; details indicating construction and materials of construction; diameter of shafting; dimensions; rated horsepower of motors; gear and bearing ratings; service factors and weights of principal parts and the completely assembled item.

C. Operation and Maintenance Manuals: Submit to the Engineer for review and approval, manuals prepared by the manufacturer/supplier in compliance with Section 01700. The submission and approval of each set of manuals will be considered to be an integral part of furnishing and installation of the respective equipment or system. The Contractor will be informed if manuals submitted are incomplete and will supply the information necessary for completion. Each manual shall be supplied with a Table of Contents and subjected matter should be indexed categorically.
   1. Include the following elements in each manual:
      a. Installation and operating instructions.
      b. Start-up procedures.
      c. Recommended and alternative operating procedures.
      d. Schedule of preventive maintenance requirements.
      e. Schedule of recommended spare parts to be stocked, complete with part number, inventory quantity, and ordering information.
      f. Detailed maintenance procedures.
      g. Schedule of lubrication requirements.
      h. Corrected and approved control and wiring diagrams.
      i. Data sheet listing pertinent equipment or system information, as well as the addresses and telephone numbers of the nearest sales and service representatives.
      j. Manufacturer's Warranty.

k. Manufacturer's Warranty Certificate.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and equipment to the Project site in a clean condition with openings plugged or capped (or otherwise sealed by packaging) both during shipping and during temporary storage.

B. Delivered mechanical equipment crating and/or packaging shall clearly identify pick-points or lift-points. In the absence of crating or packaging, pick-points or lift-points must be identified on the equipment.

C. When unloading materials and equipment provide special lifting harness or apparatus as may be required by manufacturers. Handle materials and equipment in accordance with manufacturer's written instructions.

D. The Contractor shall determine the required equipment needed for unloading operations and have such equipment on-site to perform unloading work on the date of equipment delivery.

E. Store materials and equipment, both on and off-site, in accordance with manufacturer's written instructions.

1.06 SEQUENCING/SCHEDULING

A. Interferences:
1. The Drawings are generally diagrammatic and indicative of the work. The Contractor is responsible for modifying the work with offsets, bends or other fittings to avoid minor interferences and structural obstruction. Perform such modifications at no increase in Contract Price.
2. Construct Mechanical Systems when and in a manner not to delay or interfere with other operations of work in the Project.
3. Prior to making Mechanical installations, coordinate Mechanical Work locations with other operations of work, especially in congested areas, such as mechanical equipment rooms and above hung ceilings (if any).
4. In the event that interferences develop, the Engineer's decision will be final and no additional compensation will be allowed for relocation of Mechanical Products.

B. Electrical Interface:
1. Install as work of Division 15 - Mechanical, such electrical components as provided by Product manufacturers specified under the various Sections of this Division 15.
2. Power and, if applicable, control and signal wiring, including final connections of such to electrical components or apparatus of Products specified shall be performed as work of Division 16 - Electrical.
3. Motor Starters and Disconnect Switches:

a. Motor starters and disconnect switches for the majority of the Mechanical Equipment are provided as work of Division 16 - Electrical, and are indicated on the Electrical Drawings.
b. Where motor starters and disconnect switches for mechanical equipment are not indicated as work of Division 16 - Electrical, provide such starters and disconnect switches either integral with or mounted on said Mechanical Equipment as work of this Division 15 - Mechanical.

c. Motor starters and disconnect switches furnished loose by manufacturers of Products specified in Division 15, shall be installed as work of Division 16. Locations shall be coordinated with the provider of the Division 15 Products.

1.07 WARRANTIES

A. Assigned Warranties: Manufacturer's warranties on material and equipment (including internal components) exceeding the guarantee time period as stated in the Conditions of the Contract, shall be assigned directly to the Owner.
1. Such assigned warranties shall begin on the date of Substantial Completion and the Owner's acceptance of the Work, and so dated.
2. Submit warranties along with the Operation and Maintenance Manual submission.
3. Submit sample warranties along with submission of Shop Drawings and Product Data.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Submittals for Substitutions or "Equal" Products or methods may be acceptable after award of the Contact provided they are in accordance with Supplementary Conditions Paragraphs SC-6.05.A through L, and subject to Engineer's approval.

B. Products: Material particulars and requirements are as specified in the various Sections included under Division 15 - Mechanical.
1. Piping System Specifications as applicable to several Mechanical Specifications Sections are specified in Section 15050. Products applicable to specific Mechanical Specifications Sections, or for special applications, are specified in those Sections.
2. Provide Products of new and recent manufacture.
3. For each category of materials and equipment (Products), provide Products of the same manufacturer and type.

C. Shop Painting:
1. Shop Paint: For primer coat provide only those primers that are compatible with field coats specified in Section 09900.

2. Prior to painting remove all rust, dust and scale as well as other foreign substances on ferrous metal surfaces to be prime painted in the shop, by sandblasting or pickling, or by mechanically cleaning.
    a. Sandblasting shall conform to requirements of the latest edition of the Steel Structures Painting Council Standard SSPC-SP6, Commercial Blast Cleaning.
    b. Pickling shall conform to requirements of the latest edition of the Steel Structures painting Council Standard SSPC-SP8, Pickling.
    c. Mechanically Cleaning shall conform to requirements of the latest edition of the Steel Structures Painting Council Standard SSPC-SP2, Hand Tool Cleaning.
3. Prime paint ferrous metal surfaces thus cleaned as soon as possible after cleaning to prevent new rusting.
4. Ferrous metal surfaces of equipment, apparatus, and devices shall receive a shop coat of primer (except acceptable factory-finished surfaces) unless otherwise specified or required by the Engineer.
5. Painting:
    a. Apply shop paint in accordance with SSPC-PA1.
    b. Minimum dry mil thickness at 1.5 to 2 mils.

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. General Requirements: Installation particulars and requirements are as specified in the various Sections included under Division 15 - Mechanical.
    1. Perform required interconnection of the differing mechanical systems to the various mechanical equipment, devices, or apparatus, regardless of where such Products are specified throughout Division 15 - Mechanical, in order to ensure the completeness of such mechanical systems.
    2. Install mechanical equipment level, unless indicated or directed otherwise.

B. Field Painting: As specified in Section 09900.

3.02 FIELD QUALITY CONTROL

A. General: Perform cleaning, testing, adjusting and balancing operations as specified in the various Sections included under Division 15 - Mechanical.
    1. Provide instruments, testing equipment, and such other required materials to perform the Field Quality Control Work.

END OF SECTION

SECTION 15050

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Basic materials and methods of installation specific to Division 15.

1.02 RELATED SECTIONS

A. Basic Mechanical Requirements: Section 15010.

B. Supports, Anchors, and Seals: Section 15090.

C. Piping and Miscellaneous Process Products: Section 15370.

1.03 SUBMITTALS

A. Product Submissions: As specified in Section 15010.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

A. Refer to Drawings and individual piping systems for type of pipe and pipe fittings required.

B. Individual Products as specified in Section 15370.

2.02 PIPING SPECIALTIES

A. Refer to Drawings and individual piping systems for specialties required.

B. Individual Products as specified in Section 15370.

2.03 VALVES

A. Refer to Drawings and individual piping systems for types of valves required.

B. Individual Products as specified in Section 15370.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurement: The Drawings are in general indicative of the Work, with symbols and notations for clarity. However, the Drawings are not an exact representation of all conditions involved, therefore, layout Piping to suit actual field measurements. No extra compensation will be made for Work due to difference between indicated and actual dimensions.

3.02 INSTALLATION

A. General:
   1. Run piping parallel or perpendicular to the lines of the structure. Keep piping a sufficient distance from other work to permit clearance of not less than one inch between the piping, or insulated piping and adjacent work.
   2. Install piping as close as possible to walls, overhead construction, and similar elements to facilitate insulating work and removal of piping later.
   3. Clean piping prior to installation and following installation to prepare for painting. Keep open ends of piping and pipe attachment openings on equipment capped or plugged until actual connections.

B. Interferences: Run piping to compensate for structural interferences, to preserve headroom, and not to interfere with openings, passageways and equipment. Do not install piping with joints and fittings over motors, switchboards, panels, or similar electrical apparatus.

3.03 CONSTRUCTION METHODS

A. General:
   1. Construct pipe runs from full lengths of pipe using short sections only for runs of less than full pipe length. Make changes in directions of pipe runs with fittings only.
   2. Install unions and flanges in accessible locations and whether indicated or not, install union adjacent to all equipment and wherever removal of equipment for repair or replacement is required. Use dielectric unions at points of connection of copper tubing and piping to ferrous metal piping or equipment.
   3. Use reducing fittings where reduction in pipe sizes is necessary. Bushings will not be accepted.
   4. Cut pipe accurately to measurements established in the field and assemble in place without springing, forcing, excessive cutting or weakening of the structure.

B. Underground Piping:
   1. Keep trenches dewatered until pipe joints have been made and concrete bedding and blocking, if any, have hardened. Under no circumstances lay pipe in water or on subgrade containing frost.

2. Rest each section of pipe on pipe bedding for the full length of its barrel, with recesses excavated for pipe bells so joints can easily be made. Backfill recesses with bedding material immediately following pipe joining operations.
3. Take up and relay pipe that is not laid true to required alignment or grade or has its joints disturbed after laying. No deviations from the required line and grade permitted, except with approval of the Engineer.

3.04 PIPE JOINING

A. General: Exercise care when making pipe joints and make joints in accordance with the pipe material manufacturer's recommendations and the following requirements.
1. In each instance of pipe joining, those portions of pipes involved must be absolutely clean just prior to assembly.
2. If a joint is extremely difficult to assemble or sealing is not affected, disassemble the joint and correct the difficulty if possible. Remake the joint using new materials when necessary.

B. Ferrous Metal Piping Joints: Cut pipe ends square, deburr and ream to size of original bore.
1. Threaded: Cut threads to standard gage depth and length and clean threads free of oil and cuttings. Use Teflon (DUPONT) formulation joint tape or Teflon joint paste to aid in joint lubrication and sealing in joining operation.
2. Welded: Responsibility for quality of welding, competency of welding operators and their ability to make sound welds rests with the Contractor. Technique of welding employed, appearance and quality of welds made and methods used in correcting defective work shall conform with requirements of ANSI B31.1 and its Supplements.
3. Flanged: Face accurately, install gaskets and draw up square and tight to ensure full gasket flow and seal.

C. Ductile Cast Iron Pipe Joints:
1. Push-On Joints: Properly seat sealing gasket, evenly and sufficiently lubricate the spigot end of pipe, and fully enter joint until joint line is visible. Make deflection, if required, only after the joint has been assembled properly.
2. Mechanical Joints: Properly position sealing gasket and gland for bolting and then enter the spigot into pipe bell end until joint line is visible. Tighten bolts evenly maintaining approximate distance between gland and face of flange at all points around the socket. Do not exceed pipe manufacturer's specifications for maximum torque applied to bolts.

D. Solvent-Weld (PVC Pipe) Joints: Use chemical solvent welding components as recommended by the pipe material manufacturer and comply with said pipe manufacturer's cleaning and joining instructions.

3.05 PIPE LINE SUPPORT

A. Installation: Place and support piping runs as specified in Section 15090.

END OF SECTION

SECTION 15090

SUPPORTS, ANCHORS, AND SEALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe hangers, supports and associated anchors.

B. Sleeves and seals for foundation, wall and floor penetrations.

1.02 RELATED SECTIONS

A. Basic Mechanical Requirements: Section 15010.

1.03 QUALITY ASSURANCE

A. Design Criteria:
   1. Pipe Support Systems: Provide adequate pipe support systems designed in accordance with recognized engineering practices using, where possible, standard, commercially accepted pipe hangers and accessories.
      a. Pipe hangers and supports shall conform to the latest requirements of American National Standards Institute Standard ANSI B31.1. Code for Pressure Piping, Manufacturers Standardization Society Standard Practice MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacturer and MSS SP-69 Pipe Hangers and Supports - Selection and Application.
   2. Duct Support Systems: Provide adequate duct suspension and/or support systems designed in accordance with SMACNA HVAC standards except for restrictions as specified herein.
   3. Equipment Support Systems: Provide adequate equipment suspension and/or supports designed in accordance with recognized engineering practices using, where possible, standard commercially accepted products and systems.
      a. Design and size equipment suspension and/or supports based on installation instruction or information as obtained from equipment manufacturer.

B. Anchor and Fastener Design Requirements:
   1. Sizing: Provide anchors and fasteners for Product installations of such diameters and lengths as recommended by the particular Product manufacturer involved.
      a. When sizing recommendations are not obtainable, size fasteners in the largest diameter that will pass through bolt holes as provided in the Products for anchoring and fastening purposes.
   2. Safety Factor: Determine the lengths of anchors and fasteners based on substrate materials at points of anchor installation and to provide a safety factor of four to one.

C. Materials Compatibility: Where pipe supports contact bare piping or in-line devices, provide supports of compatible material or dissimilar isolation so that neither will have a deteriorating action on the other. Where pipe supports will installed on the outside of insulated piping or in-line devices, provide approved pipe shield between insulation and support.

1.04 REFERENCES

A. American National Standards Institute (ANSI): ANSI B31.1, Code for Pressure Piping.

B. American Society For Testing and Materials (ASTM):
1. ASTM A36; Structural Steel, Spec. for.
2. ASTM A47; Ferritic Malleable Iron Castings, Spec. for.
3. ASTM A48; Gray Iron Castings, Spec. for.
4. ASTM A120; Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses, Spec. for.
5. ASTM A167; Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip, Spec. for.
6. ASTM A181; Forgings, Carbon Steel, for General-Purpose Piping, Spec. for.
7. ASTM A320; Alloy Steel Bolting Materials for Low-Temperature Service, Spec. for.
8. ASTM A563; Carbon and Alloy Steel Nuts, Spec. for.
9. ASTM A576; Steel Bars, Carbon, Hot-Wrought, Special Quality, Spec. for.

C. American Welding Society (AWS): AWS D1.1 Structural Welding Code.

D. Cast Iron Soil Pipe Institute, Cast Iron Soil Pipe and Fittings Handbook, CISPI Specifications HS-67 and 301.

E. Federal Specifications (Fed. Spec.):
1. Fed. Spec. FF-S-325, Shield, Expansion; Nail, Expansion and Nail Drive Screw (Devices, Anchoring, Masonry) Group II (Shield, Expansion Bolt Anchor) Type 4 (Wedge Expansion Anchors) Class 1 (One-Piece Steel Expander with Cone Taper Integral with Stud).

F. Manufacturer's Standardization Society (MSS) of the Valve and Fittings Industry:
1. MSS SP-58, Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP-69, Pipe Hangers and Supports - Selection and Application.

G. Sheet Metal and Air-Conditioning Contractors' National Association, Inc. (SMACNA):
1. SMACNA HVAC Duct Construction Standards, Metal And Flexible.

1.05 SUBMITTALS

A. Product Data: As specified in Section 15010; submittals required for the following items:
1. Pipe Supports.

2. Sleeve and Seal Materials.

B. Shop Drawings: As specified in Section 15010; shop drawings required for the following:
   1. Submit completely dimensioned shop drawings of piping layouts; indicating the type, design and location of pipe hangers, supports, anchors and guides required for piping installation.
   2. Submit completely dimensioned shop drawings of duct layouts indicating hanger/support locations.
   3. Submit completely dimensioned shop drawings of equipment suspension and/or support systems, including sizing of anchors and fasteners.

PART 2 - PRODUCTS

2.01 PIPE SUPPORTS

A. Base Supports:
   1. Metal (for non-submerged pipes): Where base supports are indicated for valves, pipe, and fittings, provide saddles supported by adjustable pipe columns. Constructed of stainless steel, with stainless steel U-bolt and nuts, and baseplate.
      a. Acceptable Manufacturers:
         1) Piping Technology and Products; Figure 48.
         2) J. Blanco Associates, Inc.; Figure 538.
         3) Or Equal.
   2. Concrete (for submerged pipes): Cast-in-place concrete with stainless steel, straps, anchor bolts, and nuts.

B. Brackets: Where piping is run adjacent to walls or steel columns, Provide 316 stainless steel brackets, pre-punched with a minimum of two fastener holes.

C. Hangers: Fabricated of malleable iron ASTM A47, or carbon steel ASTM A36.
   1. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
   2. Hangers for pipe sizes 2½ inches or larger shall incorporate a means of vertical adjustment after erection while supporting the load.
   3. Adjustable Band Hangers: Carbon steel band type hangers designed for suspension on hanger rods with provisions for vertical adjustments and locking in position using supporting and locknuts. Provide band hangers to support non-insulated pipe.

D. Brackets: Where piping is run adjacent to walls or steel columns, Provide welded steel brackets ASTM A36 and pre-punched with a minimum of two fastener holes.

2.02 ANCHORS AND FASTENERS

A. Anchor Bolts (Pre-Set): Where anchor bolts are indicated or required as pre-set in cast-in-place concrete, provide anchor bolts of lug or bent shape design.
   1. Galvanized Bolts: ASTM A307 for bolts, nuts and washers; and ASTM B454 or A153 for galvanizing.
   2. Stainless Steel Bolts: ASTM A320, Grade B8, AISC Type 303 or 304.

B. Drilled-In Expansion Anchors and Fasteners:
   1. Applications in Cast-in-Place Concrete (and Solid Precast Concrete Structural Elements):
      a. Anchor/Fastener: UL Listed and one-piece stud (bolt) with integral expansion wedges, nut and washer, and meeting physical requirements of Fed. Spec. FF-S-325, Group II, Type 4, Class 1.
      b. Stainless Steel Anchor/Fastener: UL Listed one-piece stud (bolt) with integral expansion wedges, nut and washer, and meeting physical requirements of Fed. Spec. FF-S-325, Group II, Type 4, Class 1. Stud of AISI Type 303 or 304 stainless and nut and washer of AISI Type 316 stainless.
      c. Acceptable Manufacturers:
         1) U. S. E. Diamond, Inc.; SUP-R-STUD.
         2) Hilti Fastening Systems; KWIK-BOLT.
         3) Molly Fastener Group; PARABOLT.
         4) Phillips; RED HEAD Wedge-Anchor.
         5) Or Equal.
   2. Drilled-In Adhesive Anchors (Horizontal Application Only): Composed of an anchor rod assembly and an anchor rod adhesive cartridge.
      a. Anchor Rod Assembly: Chamfered and threaded stud rod of ASTM A307 steel with nut and washer of ASTM A563 steel.
      b. Stainless Steel Anchor Rod Assembly: Chamfered and threaded stud rod of AISI Type 304 stainless with nut and washer of AISI Type 316 stainless.
      c. Adhesive Cartridge: Sealed capsule containing pre-measured amounts of resin, quartz sand aggregate, and a hardener contained in a separate vial within the capsule. Capsule ingredients activated by the insertion procedure of the anchor rod assembly.
      d. Acceptable Manufacturers:
         1) U. S. E. Diamond, Inc.; SUP-R-SET.
         2) Hilti Fastening Systems; HVA.
         3) Molly Fastener Group: PARABOND.
         4) Or Equal.
   3. Hammer drive-type and explosive charge drive-type anchors and fastener systems not acceptable. Lead shields, plastic-inserts, fiber-inserts, and drilled-in plastic sleeve/nail drive systems also not acceptable.

2.03 SLEEVES AND SEALS

A. Pipe Sleeve Sizing:

1. Uninsulated Pipes: Size sleeves two pipe sizes larger than pipe passing through, or size sleeves for a minimum of 1/2-inch clearance between inside of sleeve and outside diameter of pipe passing through.
2. Insulated Pipes: Size sleeves for a minimum of 1/2-inch clearance between inside of sleeve and outside diameter of insulation covering on pipes passing through.
3. Sleeve Length:
    a. Wall and Partitions: Equal to total thickness of wall or partitions and terminated flush with finished surfaces.
    b. Floors: Equal to total depth of floor construction including finish and extending a minimum of one inch above floor level.

B. Sleeve Materials:
1. Pipe Sleeves In Cast-In-Place Concrete:
    a. Fabricate from Schedule 10 black steel pipe and weld a 2-inch wide intermediate anchoring flange of 3/16-inch steel midway on pipe sleeve; or provide sleeve product similar to Fig. 204 as manufactured by F & S Manufacturing Corporation, or equal.
    b. High impact thermoplastic sleeves formed with anchor and waterstop collar, and provided with nailer end caps to position sleeve exactly in form. Provide sleeve similar or equal to Century-Line Sleeve as manufactured by Thunderline Corporation.

C. Seals and Plates:
1. Wall Seal: Hydrostatic seal designed to seal opening between pipes and a through structure opening. Provide Link-Seal by Thunderline Corp., or equal, with stainless steel nuts and bolts. Caulking, mastic sealants, lead/oakum; not equal.
2. Wall and Ceiling Plates: Cast metal with integral set screw or similar anchoring screw. Hinged or split design plates may be provided.

PART 3 - EXECUTION

3.01 PIPING SYSTEM SUPPORT INSTALLATION

A. General: The Drawings are generally indicative of the work, with symbols and notations for clarity. However, the Drawings are not in exact representation of all the conditions involved and they do not indicate every pipe support and anchor required to help or support piping. The Contractor's dimensioned pipe layout drawings shall include the supports and anchors required to properly hold or support piping in accordance with ANSI B31.1, MSS SP58 and SP69.

B. Performance:
1. Install pipe supports and anchors to hold piping straight and true to line both vertically and horizontally.
2. Where thermal movement in piping systems will occur, provide piping system supports capable of supporting the line in all operating conditions.
3. The supporting force at each hanger shall prevent excessive stress in the pipe and connected equipment.

4. Install pipe supports anchored directly to or suspended directly from structural supports. Where pipe hangers fall between structural members provide auxiliary steel supports to carry pipe hangers.
5. When supporting piping or in-line equipment from pre-engineered structural supports or equipment, Contractor shall verify adequacy of support or equipment surface to carry additional loads with the pre-engineered system or equipment manufacturer.

C. Plastic Piping: Provide hangers at locations and spacing limitations in accordance with pipe manufacturer's installation specifications; however, in no case shall spacing of hangers or supports exceed 7 ft. O/C.

D. Pipe Sleeve Installation:
1. Set pipe sleeves in concrete formwork, walls, partitions, floors and ceilings as construction work progresses. Provide sleeve for each pipe individually.
2. Provide and set sleeves to avoid delaying construction activities of other trades. Perform any additional cutting and boring required due to improperly located or omitted openings without cost to the Owner and perform such additional work under the observation of the Engineer.

E. Seals and Plates Installation:
1. Following pipe installation through sleeves in exterior walls below grade, install Wall Seal to render installation leak free. Wall Seal not required in interior walls, partitions, floor and ceilings.
2. Install wall seal as close to outside surface of wall as possible to provide a watertight seal below grade. Apply a coating of coal tar paint or other type approved coating on bolt heads and other metal parts on below grade wall seals prior to backfilling.
3. Install wall and ceiling plates to close pipe sleeve openings.
4. Install escutcheons to close pipe sleeve openings in finished areas.

3.02 ANCHOR AND FASTENER INSTALLATIONS

A. Auxiliary Steel Fabrication: Insofar as possible, fit and shop assemble steel fabrications and make ready for field installation.
1. Drill or punch holes as required for attachment of work and for bolted connections. Burned holes are not acceptable.
2. Perform welding of assemblies in accordance with AWS D1.1. Dress welds smooth and free of sharp edges and corners.
3. Perform shop painting of auxiliary steel as specified in Section 15010.

B. Threaded Bolts: Draw threaded bolted connections up tight using lock washers to prevent bolt or nut loosening.

C. Drilled-In Expansion Anchor and Fastener Installation:
1. General: In general, install expansion anchors in strict accordance with manufacturer’s instructions and in accordance with the following.

2. Drilling Holes: Use rotary hammer type drill and make drill holes to the required diameter and depth as consistent with anchor manufacturer's instructions for size of anchors being installed.
3. Diamond core drills are not permitted.
4. Minimum Embedment: Embed expansion anchors to four and one-half bolt diameters, unless otherwise indicated on Drawings.

D. Drilled-In Adhesive Anchor Installation:
1. General: In general, install adhesive anchors in strict accordance with manufacturer's instructions and in accordance with the following.
2. Drilling Holes: Use rotary hammer type drill and make drill holes to the required diameter and depth as consistent with anchor manufacturer's instructions for size of anchors being installed.
   a. Prior to setting cartridge and anchor stud, clean drilled holes free of loose material by vacuum process, finishing with a blast of compressed air, and cover hole until actual use.
3. Anchor Rod Installation: Following cartridge installation in prepared drill holes, set anchor rod to the required depth. Set anchor rods truly perpendicular (normal) to the base plate of item being anchored.

4. Minimum Embedment Table:

Adhesive Anchor Diameter	3/8 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in	1 in.
Embedment Depth	3½ in.	4¼ in.	5 in.	6-5/8 in.	6-5/8 in.	8¼ in.

END OF SECTION

SECTION 15250

MECHANICAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Insulation for piping and equipment.

1.02 RELATED SECTIONS

A. Basic Mechanical Requirements: Section 15010.

1.03 SUBMITTALS

A. Product Data: As specified in Section 15010; submittals required for the following items:
   1. Pipe Insulation Materials.
   2. Equipment Insulating Materials.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation products to the site in unbroken shipping cartons bearing a label indicating the contents and the appropriate ASTM, NFPA and UL flame and smoke hazard ratings as specified herein for the various insulation products.

B. Deliver and store insulation products protected from the weather. Store insulation on the site elevated off wet and otherwise contaminating surfaces.

PART 2 - PRODUCTS

2.01 INSULATING MATERIALS

A. Materials Option: Two types of pipe insulation materials are specified herein at the Contractor's option for pipe insulating; except for those pipe services scheduled to be insulated with Flexible insulation only or Rigid insulation only. However, mixing of insulation materials will not be permitted; except where specified otherwise herein or where directed otherwise by the Engineer.

B. Piping Insulation:
   1. Interior Above Ceilings (Domestic Hot and Cold Water): Molded fiberglass jacketed with all-service vapor retarder.
      a. Acceptable Manufacturers:

1) Owens Corning; SSL II, ASJ.
2) Or Equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Carefully inspect installed work of other Trades in connection with insulating work and verify such work to be complete, including system or equipment testing, to such point where insulating work may begin.

3.02 PREPARATION

A. Apply insulation on clean, dry surfaces only. Perform cleaning required for removal of construction debris, spills, etc.

3.03 INSTALLATION

A. Install insulation continuous through structure penetration of surfaces being insulated.

B. Apply insulation on cold surfaces, where vapor barrier is integral with insulation in a continuous unbroken vapor seal. Adequately seal hanger, support, and anchor penetrations of insulation.

C. Apply specified insulation adhesive, sealers and coatings at the manufacturer's recommended minimum coverage per gallon.

3.04 PIPING INSULATING

A. Apply insulation materials on piped services listed and in accordance with thicknesses listed in the following paragraphs. Insulate fittings and valve bodies and in-line control devices, except gage and thermometer faces, setting or measuring scales integral with in-line devices and control handles.

B. Flexible Insulation Installation: Install on piping according to manufacturer's instructions, using specified adhesive to seal both longitudinal and butt joints. Insulate in-line appurtenances to the same thickness as adjoining insulation.

END OF SECTION

SECTION 15370

PIPING AND MISCELLANEOUS ITEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Piping Material.

B. Valves.

C. Piping Specialties.

D. Testing and Disinfection.

1.02 RELATED SECTIONS

A. Supports, Anchors and Seals: Section 15090.

1.03 QUALITY ASSURANCE

A. Source Quality Control:
   1. Shop Tests and Inspection: All materials furnished by the Contractor shall be certified by the supplier for compliance with the pertinent specifications. Shop inspections and testing may be required. The cost of shop testing shall be borne by the supplier or the Contractor.

B. Field Inspection: All pipe and appurtenances shall be furnished, installed, and tested for defects in material and/or workmanship in the manner specified and in the presence of and as approved by the Engineer.

C. Disposition of Defective Material: All material found during the progress of the work, either before or after installation, to have cracks, flaws, or other defects will be rejected by the Engineer. All defective materials furnished by the Contractor shall be promptly removed by him from the site at his own expense.

1.04 SUBMITTALS

A. Shop Drawings and Product Data: Submit in compliance with Section 15010. Furnish completely dimensioned shop drawings, cuts or other data as required to provide a complete description of valves and piping specialties.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Chemicals or materials which may come in contact with or affect the quality of water and are used in the construction, treatment processes, containment or conveyance of

public water supply systems shall be certified for conformance with ANSI/NSF Standards 60 & 61.

B. Submit certificate of conformance with ANSI/NSF Standard 60 & 61 with product data submittals in accordance with Section 01300.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

A. Ductile Iron, Cement Lined (within and 5 feet outside Vault):
   1. Pipe: ANSI/AWWA A21.51/C151 and ANSI/AWWA A21.50/C150.
   2. Wall Thickness: Class 52, except flanged ductile iron threaded for pressure service shall have a Class 53 wall thickness.
   3. Cement Mortar Linings: Conforming to ANSI/AWWA A21.4/C104, except the thickness of linings should not be less than the following:
      a. 3" through 12": 1/8"
      b. 14" through 24": 3/16"
   4. Fittings: Gray iron or ductile iron ANSI/AWWA A21.10/C110 or ductile iron compact fittings ANSI/AWWA A21.53/C153.
      a. Up to 12-inch inclusive; 250 psi. rated.
      b. 14-inch through 36-inch; 150 psi. rated.
   5. Joints:
      a. Rubber-Gasket Joints:
         1) Use rubber-gasket joints for pipe and fittings installed underground.
         2) Mechanical Joint: ANSI/AWWA A21.11/C111.
      b. Flanged:
         1) Unless indicated otherwise on the Drawings, use flanged joints for pipe and fittings installed inside of structures, ANSI/AWWA A21.15/C115.
            a) Gaskets: 1/8 in. thick rubber full-face type.
            b) Bolts: ANSI B18.2.1.
            c) Nuts: ANSI B18.2.2.
      c. Mechanical Pipe Couplings: Except where otherwise indicated on the Drawings mechanical pipe couplings may be used in lieu of flanged joints.

B. Pipe Supports and Seals: Material as described in the Drawings.

C. Tie rods, nuts, clamps, and washers utilized for anchorage shall be type 304 stainless steel.

2.02 PIPING SPECIALTIES

A. Pipe Couplings: Coupling shall consist of a steel middle ring or sleeve, two steel or malleable iron flange or follower rings, two wedge-shaped resilient gaskets and sufficient number of track-head bolts and nuts.
   1. Middle Ring or Sleeve: Steel construction, ASTM A283, (Grade A), fabricated in a true circular section and free of surface defect.

2. Follower Rings or Flanges: Steel construction, ASTM A47 (Grade 32510), fabricated in a true circular section and free of surface defect, and tested and sized after welding by cold expanding a minimum of one percent.
3. Bolts and Nuts: Steel bolt, ASTM A183, double radius head or buttonhead track type with rolled threads, ANSI B1.1; and steel nuts, ANSI B18.2.2, American Standard Heavy Dimension Series.
4. Gaskets: Resilient wedge-shaped of synthetic base compound designed for raw sewage and sludge service.
5. Shop Paint: Middle and follower rings shop painted with primer compatible with specified field coat for piping where coupling is located.
6. Acceptable Manufacturers:
    a. Dresser Manufacturing Division of Dresser Industries, Inc.; Dresser Style 153.
    b. Smith-Blair; Style 411.
    c. Ford; Style FC.
    d. Viking-Johnson MaxiFit and MaxiStep.
    e. Romac; Style 501.
    f. Hymax; 2000.

B. Flanged Adapters: For joining plain-end pipe to flanged fittings and valves.
1. Acceptable Manufacturers:
    a. Dresser Manufacturing Division of Dresser Industries, Inc.; Dresser Style 127.
    b. Smith-Blair; 411.
    c. Rockwell-International; 912.
    d. Or Equal.

2.03 VALVES

A. General:
1. Provide valves of the same type by same manufacturer; suitable for the intended service.
2. Markings factory cast on the bonnet or body of each valve indicating manufacturer's name or mark, year of valve casting, size of valve, directional flow arrow and designation of working water pressure.
3. Valve pressure-temperature ratings of not less than the design criteria applicable to system components.
4. Valves shall open to the left (counterclockwise). Valves operated by nut, handwheel, lever, floorstand, or otherwise as indicated on the Drawings. Operating nuts or wheels shall have cast thereon an arrow indicating the direction of opening.
5. Valve ends as indicated on the Drawings and unless indicated otherwise shall conform to the following:
    a. Flanged: ANSI/AWWA A21.15/C115.
    b. Mechanical: ANSI A21.11.
    c. Screw End: Threaded in accordance with ANSI B2.1.
    d. Solder Type: For use in copper tubing lines: ANSI B16.18.
6. Flange bolt patterns shall match the pipe bolt pattern.

B. Flanged Gate Valves with Hand-Wheel: Design working water pressure at 150 psi (high pressure) for valves with diameters of 14 inches and larger.

1. Iron body, bronze mounted with resilient-seated wedge conforming to AWWA C509.
2. Resilient seat of Styrene Butadiene SBR or Urethane Rubber bonded to cast iron wedge.
3. Equip valves larger than 14 in. with gearing.
4. Valves shall be equipped with hand-wheel and shall open counter-clockwise
5. Exterior coating shall be epoxy coated, and interior ferrous metal parts shall be epoxy coated, AWWA C550.
6. Acceptable Manufacturers:
    a. Kennedy.
    b. Clow.
    c. Mueller.
    d. Or Equal.

C. Flanged Swing Check Valve: Full body with domed access cover and only one moving part. Access port shall be full size to allow removal of disc without removal of valve from pipe. Valve operation shall be by lever and weight.
1. Body and Cover: Ductile iron per ASTM A536, Grade 65-45, Grade B.
3. Disc and Disc Arm: Ductile iron per ASTM A536, Grade 65-45, Grade B.
4. Shaft: 304 stainless steel.
5. Seat: 316 stainless steel.
6. Body and Cover Coating: Fusion bonded, NSF-61 epoxy-coated per AWWA C550.
7. Acceptable Manufacturer and Model:
    a. CLA-VAL; 585 Series. No substitutions allowed.

D. Altitude Valve: Hydraulically operated, full ported, single diaphragm-actuated globes style valve. It shall consist of three parts: the body with seat installed, the diaphragm assembly, and the cover with cover bearing. A pilot system shall be supplied to control altitude valve operation.
1. The valve shall be ductile iron and have stainless steel trim. It shall have a fusion bonded epoxy coating on all ferrous metal surfaces.
2. The valve shall be a packless valve with no o-rings or packing glands within the valve.
3. The valve shall have a one-piece stainless steel seat. No snap seat rings shall be accepted.
4. The diaphragm assembly shall be fully guided throughout its entire stroke.
5. The valve cover shall have a locating lip to ensure for proper alignment and also ease of maintenance. There shall be no alignment pins on the cover.
6. The pilot system shall consist of a 3-way hydraulic altitude pilot with a closing speed control. The altitude pilot will have a shut off adjustment range of 90’-130’**.**
7. The pilot control system shall also contain a limit switch to monitor valve open or closed position. It shall be a single pole double throw switch to provide a dry contact output.
8. The manufacturer shall warranty the valve for 3 years from date of shipment. The manufacturer shall also provide a direct factory employee for start up, training and adjustment.
9. Acceptable Manufacturers:

a. Cla-Val; Valve Model 210-01 with X105LCW limit switch.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurement:
   1. The Drawings are in general indicative of the Work, with symbols and notations for clarity. However, the Drawings are not an exact representation of all conditions involved, therefore, layout piping to suit actual field measurements. No extra compensation will be made for Work due to differences between indicated and actual dimensions.
   2. Submit details of proposed departures necessitated by field conditions or other causes to the Engineer for approval.

3.02 INSTALLATION

A. General: All pipe shall be laid and maintained to the required lines and grades with fittings and valves at the required locations, spigots centered in bells, and all valves plumb.

B. Hammer Test: The pipe and fittings shall be inspected for defects and, while suspended above grade, be rung with a light hammer to detect cracks.

C. Cleaning Pipe and Fittings: All lumps, blisters, and excess coal tar coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry and free from oil and grease before the pipe is laid.

D. Cutting Pipe: The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe, so as to leave a smooth end at right angles to the axis of the pipe.

3.03 PIPE JOINTING

A. Jointing Ductile Iron Pipe:
   1. Mechanical Joints: To make ductile iron pipe mechanical joint, position sealing gasket and gland for bolting and then enter the spigot into pipe bell end until joint line is visible. Tighten bolts evenly maintaining approximate distance between gland and face of flange at all points around the socket. Do not exceed pipe manufacturer's specifications for maximum torque applied to bolts.
   2. Flanged Joints: Make ductile iron and steel pipe joints faced true, fitted with gaskets, and drawn up square and tight to ensure full gasket flow and satisfactory seal.
   3. Threaded Joints: Cut pipe ends square, deburr, and ream to size of original bore. Cut threads to American Standard tapered pipe threads, free of oil and cuttings. Use an approved joint tape or joint paste to aid in joint lubrication and sealing. After fabrication, paint exposed threads with red lead paint.

3.04 SETTING FITTINGS AND VALVES

A. General: Valves and fittings shall be set and jointed to pipe in the manner specified for cleaning, laying, and jointing pipe.
   1. The weight of valves and fittings is not to be supported by pipe. Refer to Drawings for location of supports.

3.05 FIELD QUALITY CONTROL

A. Disinfection of Water Piping and Appurtenances within Valve Vault: Perform disinfection in accordance with the recommended practice established in AWWA Standard C651. **Visual testing and disinfection shall be performed in the presence of the Owner**. Conduct disinfection in the following steps:
   1. Flushing.
   2. Bacteriologic Testing. (2) samples per site are required.

B. Disinfection Procedures When Cutting Into Existing Mains:
   1. Swabbing with hypochlorite solution: The interior of fittings (particularly couplings and sleeves) used in the installation shall be swabbed or sprayed with a 1 percent hypochlorite solution before they are installed.
   2. Flushing: Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve locations permit, flushing toward the work location from both directions is recommended.
      a. Perform (1) flushing per site.

C. Bacteriological Testing: After final flushing and before placing water main in service, two (2) sets per site, of acceptable samples, taken at least 24 hr. span, shall be collected from the main. Samples shall be tested for bacteriological (chemical and physical) quality in accordance with *Standard Methods for the Examination of Water and Wastewater*; and shall show the absence of coliform organisms; and, if required, the presence of a chlorine residual. Turbidity, pH, and a standard heterotrophic plate count (HPC) test may be required at the option of the Engineer because new material does not typically contain coliforms but does typically contain HPC bacteria.
   1. **Provide all bacteriological test reports to the Owner and the Engineer within 48 hours of sampling. Owner and Engineer will verify test results with responsible laboratory prior to authorizing use of the water main**.

D Sampling: **Contractor shall collect samples, submit to laboratory for analysis and shall pay related costs**. Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, as required by *Standard Methods for the Examination of Water and Wastewater*. No hose or fire hydrant shall be used in the collection of samples. The sampling pipe must be dedicated and clean and disinfected and flushed prior to sampling. A corporation cock may be installed in the main with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

E. Sample Results: If sample results from the lab indicate a measured HPC greater than 500 colony-forming units (cfu) per mL, flushing should be resumed and another coliform and

HPC set of samples should be taken until no coliforms are present and the HPC is less than 500 cfu/mL.

1. Provide bacteriological test reports to the Owner and the Engineer within 48 hours of sampling. **Owner and Engineer will verify test results with responsible laboratory prior to authorizing use of the water main**.

F. Record of Compliance: The record of compliance shall be the bacteriological test results certifying that the water sampled is free of coliform bacteria contamination and is equal to or better than the bacteriologic water quality in the distribution system.

G. Re-disinfection: If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected, the new fittings may be re-flushed and shall be re-sampled. If check samples also fail to produce acceptable results, the pipe shall be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained-that being two consecutive sets of acceptable samples taken 24 hr. apart.

END OF SECTION

SECTION 15600

HEAT GENERATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electric Unit Heater.

1.02 REFERENCES

A. Underwriters' Laboratories, Inc. (UL) Listings and Labels shall govern the quality and performance of certain Products as specified herein.

B. Factory Mutual (FM) Systems, Testing and Approval Services shall govern the quality and performance of certain Products as specified herein.

1.03 SUBMITTALS

A. Product Data: As specified in Section 01300 – Submittals.

PART 2 – PRODUCTS

2.01 WALL MOUNTED CONVECTION HEATER

A. Convection heater: Provide UL listed convection heater of capacity listed on the plans.
   1. Enclosure/Cabinet: 18 gauge steel, zinc chromate primer and polyester powder coat finish.
   2. Heating elements: Shockproof 0.475-inch diameter steel with brazed steel fins.
   3. Integral thermostat and automatic reset overtermperature cutout.
   4. 1500 watts, 120 volts, single-phase.
   4. Manufacturer:
      a. Chromalox HCH
      b. Or Approved Equal

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Installation Instructions: Install those Products, as specified previously under PART 2 and not specifically covered for installation herein under PART 3, in strict accordance with manufacturer's installation instructions and at locations indicated on the Drawings.

B. Electrical Interface: As specified in Division 16.

3.02 HEAT GENERATION EQUIPMENT INSTALLATION

A. General: Install the unit heater in strict accordance with manufacturer's installation instructions or manual. Installation includes unloading equipment at the site, rigging into place and making all required connections to provide a complete operating system.

B. Equipment Start-Up: Perform heat generation equipment start-up in accordance with manufacturer's instructions or manual.

END OF SECTION

SECTION 15800

AIR DISTRIBUTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. In-Line Supply Fan.

1.02 REFERENCES

A. Air Movement and Control Association (AMCA):
   1. AMCA Standards 210 and 300, Capacity Ratings.
   2. AMCA Standards 300 and 301, Sound Ratings.

B. Underwriters' Laboratories, Inc. (UL): Listings and Labels shall govern the quality and performance of certain Products as specified herein.
   1. UL 181; Factory-Made Air Ducts and Connectors.

1.03 SUBMITTALS

A. Product Data: As specified in Section 01300 – Submittals.

PART 2 – PRODUCTS

2.01 IN-LINE SUPPLY FAN

A. Housing shall be constructed of reinforced plastic and fitted with rubber gaskets on inlet and outlet to absorb vibration. Provide plastic wire mesh grille on outlet of fan.

B. Unit shall have sealed housing and a sealed wiring box.

C. Motor shall be single phase induction asynchronous with permanent capacitor, with sealed for life ball bearings.

D. Motor shall be IP 44 protected.

E. Motor shall be equipped with automatic reset thermal overload protection.

F. Fan shall have a molded ABS plastic impeller.

G. Fan shall be UL listed.

H. Manufacturer:
   1. Soler & Palau (TD-200S)
   2. Or Approved Equal

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Installation Instructions: Install those Products, as specified previously under PART 2 and not specifically covered for installation herein under PART 3, in strict accordance with manufacturer's installation instructions and at locations indicated on the Drawings.
   1. When manufacturer's installation instructions do not exist, and when installed locations are not specifically indicated, perform work in accordance with current accepted Trade practices concerning installation of such Products.
   2. Contractor shall make all necessary field adjustments.

B. Equipment Start Up: Perform equipment start up and ensure its proper operation prior to acceptance of Work by the Engineer.

END OF SECTION

SECTION 15851

DEHUMIDIFIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Dehumidifier.

1.02 RELATED SECTIONS

A. Basic Mechanical Requirements: Section 15010.

1.03 REFERENCES

A. Air Conditioning and Refrigeration Institute (ARI).

B. Electrical Testing Laboratories, Inc. (ETL): Listings and Labels shall govern the quality and performance of certain products as specified herein.

1.04 SUBMITTALS

A. Product Data: As specified in Section 15010: Submittals required for the following item:
   1. Dehumidifier.

PART 2 – PRODUCTS

2.01 DEHUMIDIFIER

A. General Requirements: Standard dehumidifier of portable design, which will draw room air into the unit for condensing ambient water vapor.
   1. Cabinet: Molded with galvanized subbase.
   2. Dehumidifier to have a drain hose connection.
   3. Dehumidifier to plug into wall outlet.
   4. Unit Parameters.
      a. Water Removal Rate: 24 pints/day.
      b. Fan runs only when dehumidifying.
      c. Volume: 170 CFM.
      d. Unit Power Requirement: 115V, 3.3 Amps, 1Ph.
      e. Temperature Range: 33°F to 95°F.
   5. Acceptable Manufacturers:
      a. Ebac (Model RM40).

b. Or Equal.

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Installation Instructions: Install these Products in accordance with manufacturer's installation instructions.

END OF SECTION

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Basic electrical requirements specifically applicable to all Sections of Division 16 Sections, in addition to Division 1 - General Requirements.

1.02 RELATED SECTIONS

A. Scope of Work: Section 01010.

B. Submittals: Section 01300.

C. Project Closeout: Section 01700.

D. Painting: Section 09900.

E. Divisions 13.

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with electrical construction code requirements of State, County, and such other local political subdivision specifications as may exceed the requirements of national codes, standards and approving bodies. Modify electrical construction work to conform to such laws, ordinances, rules, regulations and specifications, and at no increase in Contract Price for such modifications.

B. Code Compliance Inspection: All electrical work shall be inspected by a State-licensed and Client-authorized inspection agency for compliance with National Electrical Code. Costs for certificates and permits shall be borne by the Contractor.

C. Certificates and Permits: Upon completion of work, and prior to final Payment, furnish formal certification of final inspections to the Engineer from authorities having jurisdiction and secure required permits or certificates (if any) from such authorities. Additionally, prepare detailed diagrams and drawings, which may be required by those authorities having jurisdiction.

D. Source Quality Control: Products used throughout these Specifications, and as indicated on the Drawings, are those of companies having established reputations in the manufacture of these Products. Such products shall be manufactured by those companies specified or may be the product of other companies for which the specified

company assumes full responsibility and for which replacement parts are made available by the specified company.

1.04 REFERENCES

A. Basic References: The following codes, standards, and approvals as referenced throughout the Sections of Division 16, shall serve as the minimum standards and quality requirements directly appropriate to the work and workmanship.
   1. American National Standards Institute (ANSI): ANSI C2; National Electrical Safety Code.
   2. National Electric Manufacturer's Association (NEMA) Standards as apply to specified Products.
   3. National Fire Protection Association (NFPA): NFPA 70; National Electrical Code, and current amendments.
   4. National Fire Protection Association (NFPA): NFPA 70E: handbook for electrical safety in the workplace.
   5. Underwriters' Laboratories, Inc. (UL) Listings, Labels, and Approvals shall govern the quality and performance of certain specified Products.

1.05 SUBMITTALS

A. Provide shop drawings and Product Data in compliance with Section 01300 for items listed under Submittals in each Section of Division 16 and such items as may be scheduled on the Drawings.
   1. Product Data: Include in submittals manufacturer's descriptive literature, product specifications, published details, performance/capacity rating schedules or charts and installation instructions, all as applicable to items listed under Submittals in each Section of Division 16; and such items as may be scheduled on the Drawings. For control panels, include component descriptive literature.
   2. Submit shop drawings certified for construction by Product manufacturers and approved by the Contractor. Include location of electrical connections, wiring diagrams, panel layout, anchor bolt layout, details indicating construction and materials of construction, dimensions, and weight of the completely assembled item.
      a. Submit shop drawings applicable to items listed under Submittals in each Section of Division 16 and such items as may be scheduled on the Drawings.
   3. Items pertinent to this project must be identified or the shop submittals will be returned without review. Also, items submitted for reviews that have not been requested for review will be returned to the Contractor without comment.

B. Operation and Maintenance Data: Submit for approval the number of sets required by Section 01700 of Product manufacturer's operating and maintenance instructions bound in a hard cover binder with index and index tabs. Manufacturer's advertising literature or advertising catalogs will not be acceptable as operating and maintenance instructions. Data shall include:

1. Installation, operating and maintenance instructions.
2. Wiring diagrams.
3. Equipment parts lists.
4. Copies of all approved Shop Drawings.

C. Submit Operation and Maintenance Manuals in compliance with Section 01700.

D. Record (As-Built) Drawings: Maintain and mark a set of drawings with all changes and deviations from the original design. Use red markings. This set of drawings with accurate field changes shall be submitted to the engineer at the completion of the project.
1. Refer to Section 01700-Contract Closeout for Record Drawing requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivered Products crating and/or packaging shall clearly identify pick-points or lift-points. In the absence of crating or packaging, pick-points or lift-points must be identified on the equipment.

B. Deliver Products to the Project site in a clean condition with openings plugged or capped (or otherwise sealed by packaging) both during shipping and during temporary storage.

C. When unloading Products, provide special lifting harness or apparatus as may be required by manufacturers. Handle materials and equipment in accordance with manufacturer's written instructions.

D. The Contractor shall determine the required equipment needed for unloading operations and have such equipment on-site to perform unloading work on the date of equipment delivery.

E. Store Products, both on- and off-site, in accordance with manufacturer's written instructions.

1.07 JOB CONDITIONS

A. Interferences:
1. The Drawings are generally diagrammatic and indicative of the work. The Contractor is responsible for modifying the work with offsets, bends or other fittings to avoid minor interferences and structural obstruction. Perform such modifications at no increase in Contract Price.
2. Construct electrical systems in a manner not to delay or interfere with other operations of work on the Project.
3. Prior to making electrical installations, coordinate electrical work with the work of others.

4. In the event that interferences develop, the Engineer's decision will be final and no additional compensation will be allowed for relocation of electrical Products.
5. Do not locate electrical components below water lines, or if there is no choice, install a drain pan between the water line(s) and the electrical equipment. Such protection must be above the 6'-0 dedicated space.

1.08 DEFINITIONS

A. The following definitions apply when used in the context of these Specifications:
   1. Provide: Furnish and install, complete and ready for intended use.
   2. Furnish: Supply and deliver to project site ready for installation.
   3. Install: Place in position for service or use.
   4. Dedicated: Means one circuit in one metal conduit between device and circuit breaker.

1.09 WARRANTIES

A. Assigned Warranties: Manufacturer's warranties on material and equipment (including internal components) exceeding the guarantee time period as stated in the Conditions of the Contract, shall be assigned directly to the Owner.
   1. Such assigned warranties shall be dated to begin on the date of the Owner's acceptance of the Work, but not earlier than the date of Substantial Completion.
   2. Submit sample warranties along with submission of Shop Drawings and Product Data.
   3. Insert approved warranties in the approved Operation and Maintenance Manuals after the date of Substantial Completion has been established.

B. **Warranties which begin prior to the date of Substantial Completion are not acceptable. When manufacturers' warranties begin on the date of delivery, or any date earlier than the date of Substantial Completion, Contractor shall purchase extended warranties which shall provide coverage at least for the entire Correction Period. Cost for extended warranties shall be included in the Contract Price.**

C. Refer to Section 01750 – WARRANTIES for additional information on warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Products: Basic Electrical Materials and Methods as specified in Section 16050.
   1. Provide Products of new and recent manufacture.
   2. For each category of materials and equipment (Products), provide Products of the same manufacturer and type.

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. General Requirements: Specific installation instructions and other requirements are as specified in the various Sections included under Division 16 - Electrical.
   1. Perform required interconnection of the differing electrical systems to the various electrical Products, regardless of where such Products are specified in order to ensure the completeness of such electrical systems.
   2. It is the contractor's responsibility to become familiar with the existing equipment that will remain on the project and to allow for rewiring, rerouting, and reconnection of equipment. It is further incumbent on the Contractor to provide the necessary interface required to retain or restore existing equipment that will remain but may not be specifically mentioned or described in the design documents.

B. Field Painting: As specified in Section 09900.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom but also meet the height of working space as dictated by the National Electrical Code.

D. Working Space: Adhere to the depth and width requirements of the National Electrical Code regarding the placement of electrical equipment.

3.02 FIELD QUALITY CONTROL

A. General:
   1. Unless waived in writing by the Engineer, the Contractor shall be present during performance of the tests.

B. Electrical Systems Testing:
   1. Render the entire installation free from short circuits and improper grounds. Test feeders disconnected from the branch with the power equipment connected for proper operation.
   2. If the insulation on any conductors becomes compromised after being pulled, the Engineer has the right to require the Contractor to perform an electrical system test using Meggers, ammeters, voltmeters, insulation resistance testers, or high-pot testers prior to placing electrical systems into complete operation.
      a. Use Meggers with an adjustable voltage range up to 5.0 KV, which will permit readings of 0.05 to 100,000 Megohms. Minimum testing voltage obtained by adding 1,000 volts to twice the rated voltage of cable, device, apparatus, or equipment unless there are overriding directions from the manufacturer of the equipment. Insulation resistance shall not be less than 100 Megohms unless proven to conform to IEEE and ANSI standards.

b. Correct failure in a manner satisfactory to the Engineer or Engineer's authorized representative.

3. Tests as Follows:
   a. Operation of equipment prior to satisfactory completion of the performance tests is the complete responsibility of the Contractor.
   b. Initial Performance Testing:
      1) Contractor's personnel, with the personnel of the Owner observing, shall demonstrate the performance of each item of equipment when operated in accordance with the design intent indicated by the Drawings and described in the applicable Sections of the Specifications.
   c. Final Performance Test: Final performance test shall cover a 10-calendar day trouble-free period while the plant is in continuous, normal operation.
      1) With equipment in continuous, normal operation, the personnel of the Owner shall assume day-to-day operation of the equipment.
      2) Contractor's personnel shall demonstrate to the satisfaction of the Engineer that equipment is coordinated, and that installation complies with the applicable Drawings and Specifications.
      3) Performance tests shall be considered concluded at the end of the test period or should deficiencies be found as a result of said test, then when the deficiencies have been corrected and equipment operates to the satisfaction of the Engineer.

C. Grounding Testing:
   1. Test the grounding in accordance with specification section 16050.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit Systems.

B. Conductors.

C. Supports, Anchors, Fasteners, And Seals.

D. Identification Products.

E. Grounding.

F. Interconnections.

G. Flood Water Detection.

H. Limit Switches.

I. Control Devices.

J. Panels and Enclosures.

K. Secondary Distribution Equipment.

1.02 SUBMITTALS

A. Product Data: As specified in Section 16010; submittals required for the following items:
   1. Flood Water Detection.
   2. Limit Switches.
   3. Control Devices.
   4. Panels and Enclosures.
   5. Secondary Distribution Equipment.

B. Shop Drawings shall indicate dimensions, circuit breaker ratings and layout.

C. Operation and Maintenance Manuals: Provide operation and maintenance manuals as specified in Section 16010.

D. Submittals must contain highlighted actual catalog number derivation.

PART 2 - PRODUCTS

2.01 CONDUIT SYSTEM MATERIALS

A. Rigid Metal Conduits: Fabricated of mild steel piping, galvanized inside and outside, and protected against corrosion by a dichromate rinse or a zinc chromate coating. Each conduit shall bear the UL label, be defect free, furnished in 10 ft. lengths minimum, and of the following types:
   1. Intermediate Metal Conduit (IMC) and Fittings: Products meeting requirements of NEC Article 342 for materials and uses.
   2. Rigid Metal Conduit and Fittings: Product meeting requirements of NEC Article 344 for materials and uses.

B. Rigid PVC Conduit and Fittings: High impact PVC (polyvinyl chloride) Conduit and Fittings conforming to NEMA Spec. TC-2, as Listed and Labeled by UL, and meeting the requirements of NEC Article 352 for PVC materials and uses. Additionally, PVC conduit shall have material strengths of 5500 psi tensile, 11,000 psi flexural and 8600 psi compression: all at 78 degrees F. Provide schedule 40 conduit and fittings, except where required by NEC use schedule 80.

C. PVC Coated Flexible Metal Conduit: Conduit meeting the requirements of NEC for materials and uses. Each conduit length shall bear NEC inscription stamp, manufacturer's trademark, and shall conform to the following:
   1. Flexible, galvanized, interlocking spiral strip steel core having a smooth, liquid-tight polyvinyl chloride jacket designed to withstand temperatures from minus 50 degrees F. to plus 220 degrees F.
   2. Interlocking spiral strip construction of such to permit bending of conduit to a minimum radius of five times its diameter without deforming the spiral strips both inside and outside of the conduit.
   3. Interior and exterior of flexible conduit finished smooth and free from burrs, sharp edges and other defects which may injure wires.
   4. Conduit sizes 1/2-inch through 1¼-inch furnished with an integral continuous copper ground. Install flexible conduit sizes 1½-inch through 3-inch using a separate ground conductor.
   5. Acceptable Manufacturers:
      a. Sealtite, Type H.C.
      b. Or Equal.

D. Conduit Expansion Joints: Telescoping sleeve type designed for 4-inch maximum expansion; galvanized, weatherproof, vaportight, with insulated bushing and lead-wool packing.
   1. Acceptable Manufacturers:
      a. Crouse-Hinds, Type XJ, with ground strap GC100, and brass clamps GC102.
      b. Appleton.
      c. Or Equal.

E. Conduit Unions: Erickson Couplings where necessary to complete a conduit run when neither end can be turned.
   1. Acceptable Manufacturers:
      a. Thomas and Betts Company.
      b. Appleton.
      c. Or Equal.

F. Metallic Junction, Pull Boxes and Fittings: Provide such products meeting requirements of NEC Article 314 for materials and uses in conduit systems. No set-screw or indented type couplings or connectors permitted on this project. Provide metal barrier separation in pull and junction boxes between voltages below 100 volts and voltages over 100 volts.
   2. Provide NEMA Type 4 construction pull or junction boxes for outdoor installations, complete with required fittings and hubs.
   3. Provide NEMA Type 12 construction pull or junction boxes for indoor installations complete with required fittings or hubs.

G. Non-metallic Outlet, Switch, Junction, Pull Boxes and Fittings:
   1. Provide such products meeting requirements of NEC Article 370 for materials and uses in conduit systems. Provide manufacturer's approved bonding agent utilized for permanently securing two devices or material together.
   2. Non-metallic boxes, fittings and devices fabricated from molded, high impact strength, fiberglass reinforced polyester formulation having a glass to resin ratio of 45 to 55 percent by weight. Boxes, fittings, and devices shall meet or exceed a Class 1 flame spread rating of less than 25 (ASTM E84) and a smoke rating of 5 (NBF-258 Smoke Chamber Test).

2.03 LOW VOLTAGE CONDUCTORS

A. Low Voltage Copper Wire (600 Volts Maximum): UL Listed conductors of 98 percent conductivity copper with type THWN and THHN insulation rated 600 volts. Type XHHW insulation is also acceptable for sizes No. 8 AWG and larger. Provide conductors of proper size and ampacity ratings according to NEC Article 310 except for the following modifications:
   1. Minimum Conductor size:
      a. No. 12 AWG in power and branch feeder circuits.
      b. No. 14 AWG in control and alarm circuits.
   2. Maximum Number of Conductors in Raceways or Conduits: Not to exceed three conductors except for control or instrument wires when so indicated on the Drawings. (Exclude grounding and unbalanced current carrying neutral conductors from conductor count.)
   3. All conductors shall be stranded.
   4. Copper with type XHHW or XHHW-2 insulation shall be used in all underground installations.

5. Wire and Cable Connections:
    a. Split Bolt Connectors or Compression Type Connectors: UL Listed connectors for making parallel or butt splices of stranded COPPER wire. Provide companion preformed plastic insulating covers or tape insulation conforming to NEC requirements.
    b. Screw-Compression Lugs: UL Listed connectors for making terminal connections of stranded COPPER wire. Contractor shall provide an approved crimp tool for the type compression lugs furnished. Contractor option to provide UL Listed crimp tool compression style Lugs.

B. Shielded Analog Instrumentation Cable: 18-gauge cable fabricated using tinned copper, polyethylene insulated, the number of conductors as indicated, and shielded with aluminum polyester or aluminum mylar incorporating a tinned copper drain wire. Provide cable with insulation rated 600 volts.
1. Acceptable Manufacturers:
    a. Belden Corporation, Beldfoil.
    b. Eaton Corp, Dekoron.
    c. Or Equal.

2.04 SUPPORTS, ANCHORS, FASTENERS AND SEALS

A. Supporting Devices:
1. Field fabricated devices composed of carbon steel angles, channels, and bars meeting material requirements of ASTM A36.
2. Pre-engineered UL Listed supporting systems of electro-galvanized steel products may be used in lieu of field fabricated support systems.
    a. Acceptable Manufacturers:
        1) Kindorf.
        2) Unistrut.
        3) Or Equal.
3. Conduit Supports: One-hole fastener style, of malleable iron for exterior use, and of stamped steel for interior use. Both types provided in galvanized finish. Provide Pipe Straps similar to those as manufactured by Thomas & Betts, or equal.

B. Anchors and Fasteners:
1. Anchor Bolts (Pre-Set): Where anchor bolts are indicated or required as pre-set in cast-in-place concrete, provide anchor bolts of lug or bent shape design.
    a. Galvanized Bolts: ASTM A307 for bolts, nuts and washers; and ASTM B454 or A153 for galvanizing.
    b. Stainless Steel Bolts: ASTM A320, Grade B8, AISC Type 303 or 304.
2. Drive (Deep-Pitch) Screws: Self-tapping type.

C. Wall Seal: Hydrostatic seal designed to seal opening between conduit and a through structure opening. Provide stainless steel Link-Seal by Thunderline Corp., or equal. Caulking, mastic sealants, lead/oakum; not permitted.

2.05 IDENTIFICATION PRODUCTS

A. Provide permanent heavy-duty vinyl cloth material tape, pressure sensitive labels or markers, which when applied to conductors are easily read. Tape and labels shall be as manufactured by W. H. Brady Co., Len Products Inc., or Stanco Products, Inc.

B. Provide laminated plastic nameplates such that the background is black with white letters showing through, letters shall be ½" in height for control panels, panelboards, disconnect switches, circuit breakers, combination starters, and other larger components, and ¼" letter height for smaller components such as contactors, starters, relay enclosures, etc.

2.06 GROUNDING PRODUCTS

A. General: Provide Products conforming to UL requirements for grounding applications as specified in NEC Article 250. Materials as follows:
   1. Bare Ground Wire: UL Listed soft drawn copper, Class A or Class B stranded, meeting the requirements of ASTM B8, and sized in accordance with the NEC except where the sizes specified herein or indicated on the Drawings are larger than those required by the NEC.
   2. Insulated Ground Wire: UL Listed, copper, Class B stranded, 600-volt 90 degrees C insulated and jacketed according to NEC. Sizes as indicated on the Drawings.
   3. Clamps and Connectors: UL Listed and conforming to use requirements of NEC Article 250.
      a. Multi-bolt Solderless Compression Clamps: High strength electrical bronze with silicon bronze clamping bolts and hardware. Bolts, nuts, lockwashers, and similar hardware designed not to damage ground wire.
   4. Conduit Ground Bushings: Galvanized malleable iron with screw pressure connector; insulated throat where required.

2.07. FLOOD WATER DETECTION:

A. Refer to the Contract Drawings for Location.

B. Conductance actuated single-level service, 120 VAC operation to low voltage on the probes, 316 SS probes, normally open contact which closes on contact with water, SPDT 10-amp output contacts, NEMA 4 enclosure, kick and bump protected probes mounted 1/8" above the vault floor.
   1. General Applications: 316 SS probes.

C. Acceptable Manufacturers:
   1. Ametek - B/W Controls, Model 6012-SS-X-6B-1.
   2. Warrick Controls.
   3. Or Equal.

2.08 LIMIT SWITCH:

A. NEMA 12, N.C. 10-amp contact, double pole where shown on the drawings, 120 volts, heavy-duty turret head with lever arm or offset lever arm as necessary. Square D type 9007 or equal.

2.09 CONTROL DEVICES

A. Relays and Timers:
   1. Relays shall be general-purpose plug-in type. They shall be a minimum of double-pole, double-throw with contacts rated for 10 amps at 240 VAC.
   2. Timers shall be double-pole, double-throw, and solid-state plug-in type with contacts rated for 5 amps at 240 VAC. A "time cycle in progress" indicating LED shall be provided.
   3. Percentage Timer: UL Listed, ON time adjustable from 1% to 99% of full-scale dial, 15-second to 24-hour time interval settings, easy ON/OFF adjustments, 2-color load status LED, NEMA 4X enclosure or mechanism only if panel mounted. Timer input power rated at 120 or 240-volt, AC.
      a. SPDT contacts rated 20-amps NO and 10-amps NC at 120/240 volts AC.
      b. Acceptable Manufacturers:
         1) Agastat/ TE Connectivity
         2) Allen Bradley
         3) Potter Brumfield
         4) Or Equal.

B. Control Relay: UL-Listed relay having characteristics, components, and enclosure as follows:
   1. Relay coil voltage at 120 V.
   2. Relay shall have the number of normally-open convertible contacts as indicated on the Drawings.
   3. Relay compatible for mounting in NEMA type enclosure as required for the environment, unless indicated otherwise on Drawings.
   4. Latching relays where shown.
   5. Acceptable Manufacturers:
      a. Square D Company, Type X.
      b. Eaton Cutler-Hammer.
      c. General Electric.
      d. Or equal.

2.10 PANELS AND ENCLOSURES

A. All required panels shall be furnished fully assembled, wired and pre-programmed in a UL 508A Certified Industrial Control Panel. Controls shall be provided to control or

monitor equipment as described in the contract drawings or the contract specifications. The control systems shall include the following control components and practices:

1. All control panel single conductor wire shall be multi-strand machine tool wire (MTW) with PVC insulation, sized for the loads, and protected properly.
2. Devices mounted in the enclosure door shall have wires run in spiral wrap to avoid pinch points when opening and closing the door.
3. All control and small power wiring shall be connected to terminal strips.
4. Provide door-mounted pocket holders.
5. Provide sun shields on all exterior control panels, including top and sides, as required.
6. Control components mounted internal and external to the enclosure shall be mounted with stainless steel hardware and clearly labeled with a plastic identification nametag.

B. All control panels shall be sized for the application, shall be gasketed, and padlocked. Small enclosures and NEMA 4(X) shall be provided with 1/4-turn latches.
   1. NEMA 4X stainless steel gasketed enclosures shall be used in chemically corrosive environments both indoors and outdoors or where shown on the drawings or mentioned in the specifications.
   2. NEMA 12 stainless steel enclosures with drip shields shall be used outdoors in normal conditions or where shown on the drawings or mentioned in the specifications.

2.11 SECONDARY DISTRIBUTION EQUIPMENT

A. Branch Circuit Panelboard: Provide dead-front safety type panelboard equipped with automatic thermal-magnetic circuit breakers. Electrical characteristics of each panel as scheduled on the Drawings. Panelboard construction and components shall conform to NEMA Standards and to NEC 384, and bear the UL Label.
   1. Cabinet: Back box of code gauge galvanized steel or equivalent rust-resistant steel per UL 50 with wiring gutters sized per UL 67. Front and door of full finished (rust primer and baked enamel) code gauge steel, with concealed hinges and stainless-steel door pull and cylinder-type tumbler lock and circuit directory frame and card under clear plastic cover on door interior. The enclosure shall be NEMA 4 rated with capabilities of padlocking.
   2. Flat Style Bus Structure: Copper bus bars of rectangular cross-section and main lugs and bus structure rated as indicated on the Drawings; with such ratings established by heat rise tests per UL 67 for heat rise. Provide safety barriers to barrier main lugs or breaker on five sides; also provide barriers at bus structure ends opposite the main lugs or breaker. Breaker connections to the bus of distributed-phase or phase-sequence type. Bus bars factory-mounted to bases and not dependent on breakers for support. Screws and bolts used for making connections to bus factory equipped with lock washers, riveted connections not acceptable.

3. Stacked Bus Structure: Bus structure shall conform to requirements specified previously and arranged in stacked configuration with breaker arrangement of the distributed phase sequence.
4. Breakers: Automatic, with quick-make and quick-break action on manual operation, trip free, with inverse time characteristics secured through the use of a bi-metallic tripping element supplemented by a magnetic trip. Automatic tripping (tripping on overload or short-circuit currents) clearly indicated by the operating handle assuming a neutral position midway between the manual ON and OFF positions. Breakers having slow-make, slow-break manual mechanism not acceptable. Breakers of size and type as indicated on the Drawings. Plug-in type breakers not acceptable.
    a. Install overcurrent and short circuit protection devices in panelboard in a manner that will ensure selective coordination of these devices.
5. Acceptable Manufacturers:
    a. Eaton Cutler-Hammer.
    b. Square D Company.
    c. Or equal.
6. Panelboard Types:
    a. 240 Volts – Eaton Pow-R-Line, Square D Model NQ or similar.

B. Provide the SPD protection on each phase in accordance with Article 280 of the National Electrical Code. The SPD unit shall meet ANSI/IEEE C62.41 Location C, B & A; UL 1449 3rd edition; UL 1283 Tracking Filter; component level fusing; NEMA 4 enclosure; 25-year unlimited free replacement warranty, UL or ETL labeled.
1. For Main Service Entrance:
    a. Maximum Rated Surge Current: 80kA per phase; 40kA per mode.
    b. Acceptable Manufacturer:
        1) Total Protection Solutions; Model ServiceTrack TK-ST080-1S240-L.
        2) Surge Suppression, Inc.
        3) Or Equal: Shall mean Product must meet or exceed the requirements specified above and those of the SurgeTrack published data, with confirmation of such, as well as meeting the 25-year warranty. Manufacturer's warranty shall be modified to state the following within it: "unlimited replacement due to defects in workmanship, materials, or any electrical anomaly including lightning".

PART 3 - EXECUTION

3.01 INSPECTION

A. Carefully investigate the structural integrity and other construction work, which may affect the work of this Section. Coordinate performance of electrical work accordingly and furnish such Products as required to accommodate conditions and to preserve access to other equipment, rooms, areas, etc.

B. Prior to performance of work required for Division 16, submit detailed drawings of proposed departures from original design, due to field conditions, or other cause, and submit for Engineer's approval.

C. Inspect installed conduit and remove obstructions, dirt, and debris if present.

3.02 PREPARATION

A. Field Measurement: The Drawings are generally diagrammatic and indicative of the work. Contractor is responsible for modifying the work as needed to accommodate offsets and other structural obstructions. Perform such modifications at no increase in the Contract Price.

B. Obtain roughing-in dimensions of electrically operated Products being installed in other construction work. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.

C. Install electrical Products to suit actual field measurements and according to accepted trade standard practice. All electrical work shall conform to NEC 300 for wiring methods general requirements, and to all other applicable Articles of the NEC governing methods of wiring.

3.03 INSTALLATION

A. Methods of Wiring: In general, fabricate conduit and raceway systems in accordance with accepted trade standard practice. The following installation requirements are in addition to requirements set forth in Article 300 of the NEC.
   1. Cut conduits and raceways square and deburr cuts to the same degree as cuts made by the material manufacturer. Ream cuts of conduits per NEC requirements with openings not restricted more than cuts made by the material manufacturer.
   2. Conduit smaller than 3/4-inch trade size is not permitted, unless indicated otherwise. Running threads are not permitted; provide approved threaded couplings and connectors for metal conduits where such are required.
   3. Avoid bending conduits as much as possible and practical; use an approved conduit bending tool or machine when bends are required. Do not install crushed or deformed conduits and remove them from the site. Use flexible conduit only to the extent permitted by NEC.
   4. Mount or suspend conduit and raceway systems directly on structural members, except where indicated as being wall mounted. Space supports in accordance with NEC requirements.
   5. Attach wall-mounted conduit and raceway runs tight to walls, following contour of walls and securely attach anchors into walls.
   6. Do not weaken the structure by excessive or unnecessary cutting.

7. Make provisions for expansion in conduit and raceway runs where same cross building expansion joints. Also, in PVC schedule 40 conduits install expansion fittings as recommended by the manufacturer of the conduit.
8. The means and methods are the responsibility of the Contractor.
9. Use the properly sized fittings based on the wire size, quantity of conductors, and bending radii of conductors.
10. Make conduit and raceway runs parallel to centerlines and structure surfaces, and perpendicular to centerlines where required, with right angle turns consisting of symmetrical bends or fittings. Maintain at least 6-inches clearance between conduit and mechanical systems pipes, ducts, etc. or provide approved pipe covering over conduit for length of run.

B. Conduit Installation Schedule:
1. Exposed Vault Interior Location: Schedule 40 PVC.
2. Connections to motors, transformers, instruments, and control devices: Liquidtight flexible conduit, not more than 24 inches long for 1½-inch conduit and less, and not more than 48 inches long for two-inch conduit and greater.
3. Signal and Instrumentation Wires and Cables: Rigid Steel or IMC.
4. Underground: Rigid Steel or IMC concrete encased.

C. Wiring: Install wiring in conduit unless indicated otherwise on the Drawings.
1. Do not perform wiring until work, which might cause damage to the wires, cables or conduits, has been completed. Take the necessary precautions to prevent the accumulation of water, dirt or other foreign material in the conduits during the execution of the work.
2. Before installing wires or cables thoroughly clean conduits of foreign, gritty or other matter that would in any way damage the sheath materials or the wire or cable. Abrasions to wires, cables, or sheaths will not be acceptable, and shall be replaced at the Contractor's expense.
3. Color code wiring as recommended in NEC.
4. Make wire and cable splices in outlet or junction boxes per NEC and install such boxes in accessible locations.
5. A common neutral wire may be used on multiple circuits, within code limitations, provided the neutral conductor is sized larger than the capacity of the phase wires in the circuit. Count this wire as a conductor when sizing the conduit.
6. All instrumentation wiring shall be in steel junction and pull boxes.
7. Any wire type required for use on this project and not mentioned within these specifications shall be provided by the Contractor at no additional cost.
8. Mount the SPD unit with the shortest lead connections possible. Grounding shall adhere to the manufacturer's specifications.

D. Grounding: Perform grounding of conduit systems, metal enclosures, and equipment frames, in accordance with Article 250 of the NEC.
1. Use approved grounding connectors only. Clean the surfaces involved in the made-grounds before connecting and finish the installation with touch up painting or other protective coating to prevent corrosion.

2. Connect all existing and proposed grounding systems together into one common ground according to the NEC.

E. Interconnections:
   1. Power Wiring: Provide the required circuit breakers within the existing Northeast Tank panelboard and wire according to the drawings. Do not create a separate grounding system, tie the vault systems into the existing grounding system.
   2. Telemetry Wiring: Work with the existing SCADA System vendor, Data Flow Systems, Inc as supplied by Northern Data Systems, Inc. (NDS), 1250 Scenic Highway, Unit 1701-323, Lawrenceville, Georgia 30045; Mr. Lee White, cellphone # (240) 354-7024. Mr. White is responsible for his system; this Contractor shall provide the wiring to and termination of the incoming systems from the vault.

3.04 IDENTIFICATION

A. Feeder/Conductor Identification: Identify each cable. Label each with the wire or cable number.

B. Secure nameplates to the designated components using self-tapping screws.

C. Instrumentation and Control Wiring Identification: Identify wire and cable at both ends of the circuit with the wire or cable number, point of origin and point of termination.
   1. Provide as-built information on control system wiring diagrams regarding wire or cable identification numbering.

3.05 FIELD QUALITY CONTROL

A. Electrical Systems Test: As specified in Section 16010.

END OF SECTION

SECTION 16060

ELECTRICAL DEMOLITION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 SEQUENCING/SCHEDULING

A. The project site is an existing water standpipe facility, which must remain in operation during construction.

B. The Contractor shall be responsible for scheduling the disconnection of electrical equipment indicated on the Drawings, as specified below, or as required to achieve the final renovation results.

C. The Owner shall receive 72 hours' notice of any required shutdowns.

1.03 SUMMARY

A. The purpose of this specification section is to assist the Contractor in understanding the scope of major work shown on the drawings. It is not intended to cover all required demolition in detail. Refer to the drawings for specific demolition requirements. All work described on the drawings and the specifications shall be included in the scope of work.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Provide all materials and equipment required for patching and repair work.

B. Provide any equipment, which may be required to perform demolition and repair work.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verify field measurements and circuiting arrangements.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Drawings and these Specifications are based on limited field observation and review of existing record documents. While an attempt has been made to identify required changes, there are many elements of existing conditions that cannot be verified. Accordingly, the information provided may be incomplete or partial. It is the Contractor's responsibility to inspect the facilities and equipment to verify actual conditions. Report all discrepancies to Engineer before disturbing existing installation.

D. Beginning of demolition shall mean that the Contractor accepts existing conditions.

3.02 PREPARATION

A. De-energize, lock out and disconnect electrical sources for systems scheduled for removal.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations and wear appropriate arc flash gear where appropriate.

C. Maintain existing systems in service until new systems are complete and ready for service. Disable systems only to make switchovers and connections. Obtain permission from Engineer at least 72 hours before partially or completely disabling systems. Minimize power outage duration. Make temporary connections to maintain service in areas adjacent to work area.

D. Provide temporary power and control to new systems that are placed in operation prior to completion of final power and control sources/equipment.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction. The Engineer has used the means available to provide the Contractor with as accurate a description of the required scope of work as possible. However, this information cannot possibly convey all potential modifications and services required to provide complete and correctly functioning systems. The Contractor shall assume responsibility to fully restore operation of all existing retained equipment and systems affected by the contract work.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit.

D. Underground and in-slab conduit may be abandoned in place.
   1. Cut conduit below the floor slab and patch surfaces.

2. Outdoor: Cut conduit 12 inches below grade; plug ends of conduit and backfill to grade.

E. Repair and patch adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing electrical installations, which remain active.

G. Extend existing facilities using materials and methods compatible with existing electrical installations. New wiring and conduit shall be used.

H. Turn off and tag circuit breakers or disconnects for all retired circuits as "removed from service"

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment, which remain or are to be reused.

3.05 DISPOSAL

A. The Owner shall be contacted as to whether the Owner wants to keep the demolished panelboard and circuit breakers. The Contractor shall dispose of any demolished equipment that the Owner does not want to keep.

B. The Contractor shall be responsible for the proper disposal of all non-salvageable equipment being removed from the site.

END OF SECTION

SECTION 16961

REMOTE TELEMETRY SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The object of this specification section along with other sections is to upgrade the Northern Data Systems (NDS) communications system at the existing Northeast Standpipe to accept input from the proposed Altitude Valve Vault. All proposed alarms/monitoring points shall be conveyed to the Aberdeen Wastewater Plant. The current SCADA system, located at the Wastewater Treatment Plant (WWTP), to which this unit is connected, is by Data Flow Systems, Inc as supplied by Northern Data Systems, Inc. (NDS), 1250 Scenic Highway, Unit 1701-323, Lawrenceville, Georgia 30045; Mr. Lee White, cellphone # (240) 354-7024. Any necessary modifications shall be done by NDS; no substitutes are allowed. The following additions and modifications shall be made to the existing standpipe telemetry equipment to accept discrete and analog input signals from the Vault for monitoring at the WWTP:
   1. Altitude Valve Closed Indication (DI).
   2. Vault Intrusion Alarm (DI).
   3. Vault Flood Alarm (DI).
   4. Two (2) spare points (DI).
   5. Pressure Transducer (Residential Side of Altitude Valve) (AI).

B. NDS, through the Contractor shall provide, calibrate, test, start-up and place in satisfactory operation.

C. NDS shall furnish any necessary communications equipment; it is the Contractor's responsibility to mount the equipment, install the wiring, and make the electrical connections both to the equipment at the standpipe and at the Wastewater Plant.

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. The system configuration indicated is diagrammatic. The locations of equipment are approximate unless dimensions are shown.

B. In the case of conflict between any mandatory requirements and Specifications or Drawings, the mandatory requirement shall be followed in each case, but only after submitting such proposed changes to the Engineer for approval. No extra costs shall be allowed.

1.03 SUBMITTALS

A. Submittals and Product Data: In compliance with Section 16010 – Basic Electrical Requirements. All submittals shall be submitted in hard copy.

B. The Contractor shall prepare and submit complete and organized submittals as specified herein.
   1. The Contractor shall review all shop drawings and incorporate all interface requirements into the shop drawings. This shall include interfaces between instruments, motor starters, control panels, meters, and all equipment related to the instrumentation and pump control system.
   2. Partial or fragmented submittals will not be accepted for review.
   3. A functional description shall be provided. The descriptions shall incorporate all interlocks with other systems or items of equipment.
   4. Should an error be found in a shop drawing during installation or start-up of equipment, the correction, including any field changes found necessary, shall be noted on the drawing and submitted to reflect the final "as-built" condition prior to acceptance of the project.
   5. The Contractor shall respond to all re-submitted shop drawing comments either by making the noted correction or stating why it was not revised. Any re-submittal received by the Engineer, which does not contain responses to the Engineer's previous comments will not be reviewed and will be returned. Refer to Section 01300 – Submittals for excessive re-submittals.

C. Operation and Maintenance Manual: All Manuals shall be submitted in hard copy. The manuals shall include data, information and drawings for the system, subsystems, and all components and shall include names, addresses and telephone numbers of equipment suppliers and service companies. The control system's Operations and Maintenance Manual submittal shall be included in a singular all-inclusive submittal.

1.04 WARRANTY

A. The complete monitoring and control system and each item of instrumentation and control equipment (and associated software) included therein shall be guaranteed to meet or exceed the design requirements set forth in this section of the Specification and on the Drawings.

B. The system shall be warranted for one year after the date of Substantial completion, and acceptance of the system by the Owner. Warranty shall cover both labor and material. Any warranty provided by the manufacturer or the supplier that is for a greater period than the one-year as stated above shall be assigned directly to the Owner.

C. Refer to Section 01750 – WARRANTIES for additional information on warranties.

PART 2 - PRODUCTS

2.01 RADIO TELEMETRY SYSTEM

A. The existing system shall be modified as required to make the modifications described above.

PART 3 - EXECUTION

3.01 EQUIPMENT, MATERIALS AND WORKMANSHIP

A. System manufacturer shall perform all installation supervision, calibration, testing, adjustment, start-up, maintenance, and commissioning, using qualified experienced personnel who are technically skilled in their trade, and are thoroughly instructed.

3.02 INSTALLATION

A. Install systems to meet the intent of these specifications, other specification sections, and the Contract Drawings.

B. Operate the systems to the satisfaction of the Owner; the systems shall be run through all modes of operation. Repair all items that malfunction during the testing and retest until required operation is achieved.

C. Install necessary software updates and modifications at the wastewater treatment plant to accept the project points.

3.03 CALIBRATION

A. General: Northern Data Systems shall calibrate its complete system after installation.

3.04 INSTALLATION TEST

A. General: System shall be exercised through operational tests in the presence of the ENGINEER and OWNER in order to demonstrate achievement of the specified performance.

B. NDS shall check its completed installation and make all necessary adjustments for satisfactory operation of the system.

C. A complete integrated system test shall be performed.

D. The results of all test activities shall be documented.

E. Upon the satisfactory completion of the tests, a certified report, including all test documentation, shall be furnished to the Engineer.

3.05 TRAINING OF PERSONNEL

A. General: Provide training for the purpose of familiarizing Owner's personnel.

END OF SECTION

I. WATER MAIN CONSTRUCTION

1) PIPE, DUCTILE IRON (D.I.P)

Slip Joint	Restrained Joint
U.S. Pipe & Fdy.	T.R. Flex
Griffin	Snap Lock
American	Flex Ring
McWane	Super Lock
Atlantic States	
Clow	

Special Thickness Class
Note:
3" – 6" Class 52
8" - 12" Class 52
14" & above Class 52

2) PIPE, POLYVINYL CHLORIDE WATER
North American Pipe
J.M. Eagle
National Pipe & Plastic
Diamond

Note:
Rubber Ring Slip Joint Only
3" or smaller – SDR-21-200 psi
4"-12"-DR-14-200 psi

3) PIPE, CAST IRON (C.I.P.)

Not approved.

4) PIPE, WATER SERVICE (3/4", 1", 1'1/2", 2")

Copper Tubing-Type K (All Sizes)
Halstead
Reading
Cerro
Mueller Tubing Company
Howell Metals
Cambridge-Lee

5) FIRE HYDRANT, 5-1/4" VALVE OPENINGS - MECHANICAL JOINT

M&H Reliant Style 929
Mueller Centurion A-423
Kennedy Guardian K-81-A
American B-84-B
Clow-Medallion-F-2545
U.S. Pipe Metropolitan 250 Model 94

6) PAINT FOR FIRE HYDRANTS "SCHOOL BUS YELLOW"

Sherwin-Williams - Yellow #B54Y157
Coronado #COR80-151-1

7) RESILIENT SEAT/WEDGE VALVES MECHANICAL JOINT (Flanged For Interior Use)

Sizes Thru 30" (AWWA C-509-01)
Clow Series F-6100 (4"- 48")
Kennedy Kenseal (4"-12")
M&H Style 4067 (4"-12")
Mueller Series A-2360-20 (4"-12")
U.S. Pipe V&H – USP-0-20 (4"-12")

Sizes 4" - 12" (AWWA C-515)
American Flow Control 2500 series (4"-12")
Clow 2638 series (4"-12")
Kennedy KS-RW series (4"-12")
M&H 7000 series (4"-12")
Mueller A-2361 series (4"-12")
U.S. Pipe – AUSP1 series (4"-12")

Sizes 14" - 36" (AWWA C-515-02)
American Flow Control Series 2500
Clow Series F-6100
Kennedy Kenseal
M&H Style 7571
Mueller Series A-2361-20
U.S. Pipe V&H – USP-1-20 (14"-48")

Sizes 24" and Above
Pre-approval required

Note:
1. Gearing required above 16"
2. 3"-36" Non-Rising Stem
3. 3"-16" OS&Y
4. Brass Test Plug
5. All valves are required to use 304 or 316 stainless bolts and nuts. The County may require 316 stainless fasteners to be used in lieu of 304 stainless in instances where it deems necessary.

8) BUTTERFLY VALVES (24" & LARGER) (Valve Shafts-Horizontal)

Submit shop drawings

9) VALVE, COMBINATION AIR/VACUUM RELEASE

Duo Matic/Kenetic*

1" on Mains thru 12"
Apco (Valve & Primer) 143-C 142
Valmatic 201-C 101
Cla-Val Series 36
A.R.I. D-040

2" on Mains 14"-20" (Where Specified)
Apco 145-C 144
Valmatic 202-C 102
Cla-Val Series 36
A.R.I.

*Kenetic-Harford County Model

10) TAPPING SLEEVE ONLY (MECH. JOINT)

U.S. Pipe
M&H Valve 6" – 12"
Mueller 4"-12" H-619(A.C.)
Mueller 4"-24" H-615 (C.I., D.I.)
Tyler Pipe 4"-12" S-149 (for C.I.),
S-349 (for A.C.) 4" – 12"
American Flow Control M.J. Sleeve -
D.I. 4"-36"

14" and Greater For A/C Pipe (Pre-app. required)
JCM-414
Romac-FT425

Note:
1. 304 or 316 S.S. nuts and bolts
2. Coating – Epoxy (fusion), E-coat

11) FITTINGS-MECHANICAL JOINT-CEMENT LINED OR EPOXY COATED - D.I. 3"–48" (Flanged for Interior Use)

Star 3" – 48"
Tyler Fdy – 36"
Tyler Fdy./Union Fdy (C.I. upon request) – 3"- 48"
Clow – 4" – 30"
HarCo-PVC - Slip Joint with restraints
Union Fdy. (C.I. upon request)
Sigma 3" – 48"

Note:
1. 48" Class 350 D.I (AWWA C-53)
2. M.J. Fittings to be Cement Lined
3. Flanged Fittings to be Epoxy Coated where available
4. Flanged fittings to have 304 or 316 S.S. bolts w/brass nuts.

12) RETAINER GLAND DUCTILE IRON -WEDGED (For D.I.P. Only)

EBAA Iron Mega-A-Lug
Uni-Flange/Ford Wedge Action-Series 1400
Mueller Company-Aqua Grip (4"-12")
(Fire Hydrant and Valve Only)
Star Grip – 3000 series
Sigma – SLD – one lock
Tuf-Grip-Tyler-Union Foundry

Note: epoxy, nylon, mega-bond, e-coat, star bond.

13) PIPE COUPLING - FOR D.I.P., C-900, AC

*Ford - Style FC 2"-24"
*Smith-Blair - Style 441 2"-16"
*Romac - Style 501
Hymax – 2000 2" – 16"

*Submit shop drawing for A.C above 10" for approval

Note:
1. All couplings to be coated w/epoxy, nylon, e-coat.
2. 304 or 316 S.S. nuts and bolts

14) VALVE BOX SCREW-TYPE 2-PIECE 36"- 48" (5-1/4") (3" Valves & Larger & Blow-off)

Bingham & Taylor #4905
Capital Foundry of Virginia, Inc. #564s
East Jordan #664-S

15) CURB-BOX LOCKING SCREW-TYPE (4-1/4")

Bingham & Taylor #4903
Capital Foundry of Virginia, Inc. #NH-138-H-UP

16) METER VAULT (18", 24", 30") (Pre-Cast Concrete)

Mayer Brothers, Inc.

17) 18" METER FRAME & COVER

A.Y. McDonald
- Frame # 74MACF18
- Single Hole Lid # 74MCL115T
- Double Hole Lid # 74MCL115TT

Bingham & Taylor
- Frame # CULF18018SP
- Single Hole Lid #IFL90301WS
- Double Hole Lid # IFL90322TRF

Capital Foundry of Virginia, Inc.
- Frame # MBX-3437-F
- Single Hole Lid # MBX-347-C-H
- Double Hole Lid # MBX-3437-C-2H

Ford Meter Box Company
- Frame # FA32C
- Single Hole Lid # C3L-T
- Double Hole Lid # C3L-TT

Vestal 32-482

18) EXTENSION RING

	18"x24"
Ford	Ext 1
Vestal	32-04332-ER1824
A.Y. McDonald	74MX1

	18"X30"
Ford	Ext 3
Vestal	32-047ER1830
A.Y. McDonald	74MX1

19) VALVE/METER VAULT, PRE-CAST CONCRETE, LARGE

Mayer Brothers, Inc.
Terre-Hill
Atlantic Precast
A.C. Miller/Fabcrete Pre- Piped Vault

Note: Vault manufacturers not NPCA certified may be permitted to supply vaults if other requirements can be met. Contact the Division of Water and Sewer Maintenance Section for details.

20) 4" FRAMES & COVERS FOR VALVE VAULTS and AIR-RELEASE MANHOLES

East Jordan Iron Works
E.A. Quirin Foundary
Neenah Foundary

24" Frame-1565-2001
Lid No-1565-5134

30" Frame-1568-2000
Lid No. 1568-5001

21) ALUMINUM METER VAULT DOORS (H-20 Loading)

BilCo
Syracuse Castings
Just-Set P.A. Insert (Har. Co. Spec.)

22) PRE-CAST VAULT TO PIPE LINE CONNECTOR

Atlantic Pre-Cast – A-Lock (<18° grade)
Z-Lock (<18° grade)
Terre-Hill Concrete Products – Dual Seal II
RX101 Water Stop
Hail Mary Rubber Company – Star Seal

23) JOINT PROTECTOR (Steel End Ring Concrete Pipe)

Flex-Protex Pipe Ring Protectors
MarMac Mfg. Company

24) SERVICE SADDLE

Ford Style FC-202
Romac 202N
Smith-Blair 317 Nylon-Coated
Mueller DN2S or DE2S
JCM – 406
Power Seal-3417

a. Specify type of pipe when ordering.
b. All saddles to be epoxy, nylon, or high density fusion plastic, E-Coat.
c. Pre-sized for PVC pipe.

25) INSIDE METER SETTING
Note: Plumbing Department Use Only

5/8" Meter #1 Handyhorn:
Ford #HH1-34G
McDonald 742-1----TT33
Mueller 200- 1412 (State Size)

3/4" Meter Kornerhorn:
Ford 02A-95277 w/2 ea. PJA4-44G
McDonald 741-3----PP55
w/2 ea. 74754 T (1" x 1-1/4")
Mueller 330-H1442----02 (State Size)

Sweat Joint
5/8" McDonald-743-1----SS33
¾" N/A
5/8" Ford - #1 Copper Horn
¾" N/A

26) CORPORATION STOP, COMPRESSION JOINT

3/4"-2"
Ford FB-1000 Gripper Joint
Mueller B-25008 110 Compression
McDonald 74701Q Compression

27) CURBSTOP, THREADED

3/4"-2"
Ford B-11 Series
Mueller B-20283
McDonald 76101

28) CURBSTOP, COMPRESSION JOINT

Ford B-44 Series Gripper Joint
Mueller B-25209N 110 Compression
McDonald 76100Q Compression

29) COUPLING, COPPER COMPRESSION JOINT

Ford C-44 Series Gripper Joint
Mueller H-15403N 110 Compression
McDonald 74758Q Compression

30) Y-BRANCH COUPLING, COMPRESSION

Ford: 1" x 3/4" x 3/4" Y-44-243G Gripper Joint
1½" x 1" x 1" Y-44-264G
*Mueller: H-15343N 110 Compression
*A.Y. McDonald:708YSQ Compression

*Specify size.

31) CATHODIC PROTECTIVE CAP NUT (Oversized)

Protector Cap
Trumbull Industries
Mars Co.

32) DISMANTLING JOINT

Smith-Blair Series 975
Romac DJ-400

Note:
1. W/S.S. tie-rods and nuts, w/epoxy, nylon, or e-coat coating.
2. 304 or 316 S.S. bolt w/brass nuts.

33) FLANGE PIPE/ADAPTOR

Flanged end spool piece to be used, Minimum working pressure 200 psi
Hymax
EBAA-2100 Series

Note:
1. Pre-approved only.
2. Epoxy, nylon, e-coat coating.
3. 304 or 316 S.S. bolt w/brass nuts.

III. WATER AND SEWER MAIN CONSTRUCTION

1) STEEL CASING PIPE

Approved after shop drawing submittal.

2) LINER PLATE

Approved after shop drawing submittal.

3) DETECTOR TAPE
(3" Non-Metallic)

Lineguard
Allen Systems
Linetec
Empire Level

4) TRACER WIRE
(7 Strand No. 8 w/.045 PE Wall Blue)

All Manufacturers

5) SOLDERLESS SPLIT BOTTOM CONNECTORS

Brass

6) SPLICING TAPE-UNDERGROUND

3M

7) BITUMINOUS COATING
(Military Spec. C-18480)

All Manufacturers

8) COAL TAR EPOXY
(16 Mil D.F.T. Min)

All Manufacturers

9) NON-SHRINK EPOXY GROUT

All Manufacturers

10) CATHODIC PROTECTIVE CAP NUTS
(Oversized)

Protector Cap
Trumbull Industries
Mars Co.

11) REPAIR CLAMPS

4" - 15" Two-Section
Smith-Blair 262
Ford Style FS2
Romac Style SS2
Powerseal Style 3122 AS
Hymax – Easy Max

16" and above Three-Section
Ford Style FS3
Smith-Blair Style 263
Romac Style SS3
Powerseal Style 3123 AS

12) 2-1/2" TRACER TEST BOX W/TERMINAL BLOCK

Bingham & Taylor – P-200 Test

Note:
1. Blue lid for water. Green lid for sewer
2. Test location at fire hydrant

13) 5" TERMINAL BOARD (THREE TERMINALS) W/STANDARD 4-1/4" LOCKING CURB-BOX

Bingham & Taylor –

Note:
1. Blue lid for water. Green lid for sewer

14) INTERIOR MANHOLE COATING

Sentry Polymers, Inc.
Epoxy Vinyl Ester (Semstone 5301)

15) PIPE SUPPORT/SPACER FOR SLEEVE

PIPELINE Products, Inc.
J-Four-M33-s.s.
Raci-casing spacer
CCI Pipeline System C558

16) SLEEVE/CARRIER PIPE END SEAL

CCI Pipeline Systems
Model ESC
Model ESW