

SPECIFICATIONS AND CONTRACT DOCUMENTS

for the

Aztec Reservoir #1 Improvements, Phase 2

BID NO. ITB-2024-843

November 2023

Prepared for

**CITY OF AZTEC
201 W. Chaco St.
Aztec, NM 87410**

BOHANNAN HUSTON, INC. PROJECT NO. 20220380

**7500 Jefferson Street NE
Albuquerque, NM 87109
(505) 823-1000**



ENGINEER OF RECORD:

Bohannon Huston, Inc
7500 Jefferson Street NE
Albuquerque, NM 87109
(505) 823-1000 or Fax (505) 798-7988

The technical material and data contained in the specifications were prepared under the supervision and direction of the undersigned, whose seal as a Professional Engineer, licensed to practice in the State of New Mexico, is affixed below.



Andrew Swartswalter, P.E.
Engineer of Record

License No. 24195

All questions about the meaning or intent of these documents shall be submitted only to the Engineer of Record, stated above, IN WRITING or EMAIL at aswartswalter@bhinc.com for interpretations.

Approved by Owner:

City of Aztec

The work contained in the bidding documents have been reviewed and meet the Owner's project requirements.

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FOR AZTEC RESERVOIR #1 IMPROVEMENTS, PHASE 2
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INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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ADVERTISEMENT FOR BIDS

City of Aztec
Aztec, New Mexico
Aztec Reservoir #1 Improvements, Phase 2

General Notice

City of Aztec (Owner) is requesting Bids for the construction of the following Project:

Aztec Reservoir #1 Improvements, Phase 2

ITB 2024-843

Bids for the construction of the Project will be received electronically via BHITracker, until **Wednesday, December 20, 2023 at 3:00 PM** local time. At that time the Bids received will be **Virtually** opened and read.

The Project includes the following Work:

The project is in the City of Aztec in the County of San Juan, New Mexico. The work will take place at the existing City reservoir off Navajo Dam Rd. and Rd 2960 and includes: Demolition and disposal of 47,500 SF of existing concrete, demolition and disposal of the existing outlet tower structure, re-grading the existing reservoir slopes, installation of 138,000 SF of 60 mil HDPE liner, construction of a new outlet structure and access bridge, construction of a concrete access ramp, and installation of a new 20" inlet line.

Bids are requested for the following Contract: Aztec Reservoir #1 Improvements, Phase 2 / Bid No. ITB 2024-843

Obtaining the Bidding Documents

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

www.bhinc.com

Prospective Bidders are required to register with the designated website by clicking on BHITracker and selecting "Aztec Reservoir #1 Improvements, Phase 2" project. Register your company account by providing the following contact information: Company name, contact name, company role, telephone number, and email address. The Bidder will receive a notification email with a specific username and password in order to gain access to the "Aztec Reservoir #1 Improvements, Phase 2" project. Each registered Bidder will be able to re-access the documentation from <https://bhitracker.bhinc.com/BiddingList.aspx>. Bidding Documents may be downloaded from the designated website, which will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website.

Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

If you have issues accessing the BHITracker site, please notify the Engineer at aswartzwalter@bhinc.com as soon as possible.

The following shall be performed through the BHITracker site:

1. **DOWNLOAD THE BIDDING DOCUMENTS FROM THE PROJECT TRACKER SITE:** The bidding documents are available during the bidding phase from the CONTRACT DOCUMENTS tab under

the BIDDING DOCUMENTS subsection. When issued, addenda will be available from the ADDENDA SECTION.

2. **PLEASE SUBMIT ALL QUESTIONS THROUGH THE PROJECT TRACKER SITE:** To submit a question, go to the BIDDING tab and click on SUBMIT QUESTION. This will direct you to a form to enter the question, when complete click SUBMIT, and the question will be sent to BHI for review. Responses to questions will be included in the Addenda section (under the CONTRACT DOCUMENTS tab), and bidders will be notified via email when this information is available.
3. The bidder's list is provided in the BIDDERS LIST tab.

Pre-bid Conference

A non-mandatory pre-bid meeting will be held at **2:00 PM** on **Wednesday, November 29, 2023** at the Aztec Water Plant located at 201 W Navajo Dam Rd., Aztec, New Mexico 87410, to be followed by a site visit of the project site.

Addenda

Last day for Questions will be **Monday December 11, 2023** at **5:00 PM**. The Final Addendum will be issued by **Wednesday December 13, 2023** at **5:00 PM**.

Instructions to Bidders.

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

This Advertisement is issued by:

Owner: City of Aztec

By: Ruben Salcido

Title: Public Works Director

Date: 11/8/2023

ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

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

and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within 3 days of Owner's request, Bidder must submit the following information:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. *Contractor Licenses*. The following licenses are needed for this project (refer to NMAC 14.6.6.9 *General Construction Classifications*):
 - 1. GF-3 and GF-9 or
 - 2. GF-98
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

- 5.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of

materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 Existing Site Conditions

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
4. *Geotechnical Baseline Report/Geotechnical Data Report*: The Bidding Documents contain a Geotechnical Baseline Report (GBR) and Geotechnical Data Report (GDR).
 - a. As set forth in the Supplementary Conditions, the GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations ("Baseline Conditions"). The GBR is a Contract Document.
 - b. The Baseline Conditions in the GBR are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the Baseline Conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the GBR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.
 - c. Nothing in the GBR is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.
 - d. As set forth in the Supplementary Conditions, the GDR is a Contract Document containing data prepared by or for the Owner in support of the GBR.

- B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in

Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

A. No other Site-related documents are available.

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

- A. Examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";
- E. Consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- I. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

5.05 *Owner's Safety Program*

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

5.06 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:

- A. **Questions are to be submitted to Andrew Swartswalter at Bohannon Huston, Inc. via BHITracker at www.bhinc.com.**

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the

form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

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

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 Pursuant to §13-4-13.1 to 13-4-42 NMSA 1978, known as the Subcontractors Fair Practices Act, the identity of certain Subcontractors, Suppliers, individuals, or entities are required to be submitted to Owner by all Bidders at the time of Bid opening, on the form included in the bid documents. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of

Award is given, request apparent Successful Bidder to submit a substitute *in accordance with the Act*.

- 11.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.
- 11.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 11.05 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.07.

ARTICLE 12—PREPARATION OF BID

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

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

ARTICLE 13—BASIS OF BID

13.01 *Base Bid with Alternates*

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

13.02 *Unit Price*

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

13.03 *Allowances*

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

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

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

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful

Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—WAGE RATE REQUIREMENTS

21.01 Contractors, prime contractors and subcontractors shall be registered with the New Mexico Department of Workforce Solutions (NMDWS) at the time of bid opening. The Owner shall not accept a bid on a public works project from a Contractor that does not provide proof of required registration for itself.

ARTICLE 22—EXTENDED PAYMENT PROVISION

22.01 This construction contract specifically provides for a payment later than twenty-one days after submission of an undisputed request for payment. Owner will make payment within forty-five days after submission of an undisputed request for payment.

BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: City of Aztec, 201 W. Chaco St., Aztec, NM 87410. **Bids shall be submitted through BHITracker via www.bhinc.com.** Instructions are included in the Bid Advertisement.
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Required Bidder Qualification Statement with supporting data;
 - G. Veterans Preference Certification;
 - H. Non-Collusion Affidavit;
 - I. Campaign Contribution Disclosure Form;
 - J. Certification Regarding Debarment Suspension; and
 - K. Drug-Free Workplace Certification

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

- 3.01 *Unit Price Bids*
- A. Bidder will complete the Bid Form attached to this document for the City of Aztec Reservoir #1 Improvements, Phase 2 Project.
 - B. Bidder acknowledges that:
 - 1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and

2. Estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 4—BASIS OF BID—COST-PLUS FEE

4.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 5—TIME OF COMPLETION

5.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

5.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

6.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

6.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

6.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda: **[Add rows as needed. Bidder is to complete table.]**

Addendum Number	Addendum Date

ARTICLE 7—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

7.01 *Bidder’s Representations*

- A. In submitting this Bid, Bidder represents the following:
 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

7.02 *Bidder's Certifications*

- A. The Bidder certifies the following:
 1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.: (if applicable) _____

BID FORM**Aztec Reservoir #1 Improvements, Phase 2**
City of Aztec Project No. ITB 2024-843
Unit Price Bid Proposal**BASE BID**

Bid Item #	Description	Units	Quantity	Unit Cost (\$)	Total (\$)
1	Construction Surveying, Staking and As-Built Preparation, compl.	LS	1		
2	Construction Mobilization, compl.	LS	1		
3	Construction Demobilization, compl.	LS	1		
4	Construction Traffic Control & Barricading, compl.	LS	1		
5	NPDES compliance, development and implementation of Stormwater Pollution Prevention Plans and Water Control Plans, cip	LS	1		
6	Seeding: Hydro-mulch, cip.	AC	1		
7	Clearing and grubbing, compl.	AC	2.5		
8	Demolition and disposal of existing concrete lining, pipe penetrations, bollards, and all associated materials within reservoir limits including off-site hauling. Bollard demolition and disposal incidental to bid item.	SF	47,500		
9	Tower Abutment and Structure including excavation, backfill, subgrade prep, concrete, pipe penetrations, steel, and metal truss bridge, grating and paint, cip.	LS	1		
10	High Density HDPE Pond Liner, textured, 60 mil, to include all Penetration Seals, polylock strips and associated embedment/installation, anchor trenches and fill, concrete collars, removal and replacement of existing conduits, subgrade prep, compaction and installation, cip.	SF	138,000		
11	Structural concrete for access ramp and ramp footing: 4000 psi with #4 rebar, and Xypex C-500 admixture or approved equal. To include formwork, labor, and installation. See detail 1, DWG D-03. Including excavation and backfill, cip.	CY	190		
12	Subgrade Prep. 12" thick at 95% compaction, cip.	SY	950		
13	Aggregate Base Course, crushed, 4" thick at 95% compaction, cip.	SY	200		
14	24" Layer of Sand, including delivery and installation	CY	3,700		

BID FORM

Bid Item #	Description	Units	Quantity	Unit Cost (\$)	Total (\$)
15	Cut/Fill earthwork, including excavation, backfill and compaction, grading, and clay removal from reservoir floor. Suitable on-site material may be used for fill. CIP at 95% compaction.	CY	8,900		
16	Borrow, backfill and compaction of suitable fill material when not obtained from within limits of construction (hauling) CIP at 95% compaction	CY	4,000		
17	Haul and disposal of unsuitable site soils and excess material including clay, complete in place	CY	4,120		
18	New pipe for re-installation of existing pipe penetrations to include all necessary material, pipe, fittings, transition couplings, restraints, backfill and compaction. (Approximately 60 LF of 30" PVC, and 50 LF of 15" PVC) Transition to existing pipe material, contractor to field verify. Complete in place.	LS	1		
19	Temporary Removal of 6" piping, and re-installation following construction activities. To include all necessary materials, fittings, restraints, backfill, and compaction. Complete in place.	LF	30		
20	20-inch Suction ductile iron pipe including fittings, restraints, reducers, trenching, backfill and compaction, all depths, cip.	LF	260		
21	20-inch Diameter Gate Valve, cip. SD2326 with Box and Cover (NMPWSS SD DWG 2326)	EA	1		
22	Temporary removal of site fencing and re-installation following construction activities, cip.	LF	1420		
23	Headwall Slide Gate, including all associated fittings, fabrication, labor, installation, and leak testing, cip.	EA	2		
24	Pre-Cast Concrete Grade Control Indicator, including 5' x 5' secondary HDPE liner layer, installation, and labor, cip.	EA	7		
25	Electrical Improvements including trenching and backfill for underground conduit, underground pull boxes, conduit/conductor, work in existing panelboard, equipment racks, etc.	LS	1		
26	Fabricate control panels, including all required components	LS	1		
27	SCADA integration including work required in existing RTU and required components. Programming necessary to integrate reservoir instrumentation into existing system.	LS	1		

BID FORM

28	Reservoir instrumentation, including installation and integration into existing SCADA system	LS	1		
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a) Subtotal	
b) Construction Materials Testing Allowance	\$25,000.00
c) Geotechnical Exploration Allowance	\$10,000.00
d) Base Bid: Total of Bid Items 1-28 and Allowances	
e) New Mexico Gross Receipts Tax (NMGRT) @ 8.1875%	
f) Total of Base Bid	

_____ Dollars

(Base Bid Total Cost written in words)

BID FORM

ADDITIVE ALTERNATE #1

Bid Item #	Description	Units	Quantity	Unit Cost (\$)	Total (\$)
1	2" Air Release Valve, including manhole & lid, trenching, backfill, and compaction, any depth, cip.	EA	3		
2	3" Air Release Valve, including manhole & lid, trenching, backfill, and compaction, any depth, cip.	EA	4		
3	Removal and disposal of existing Air Release Valve, all sizes, any depth, cip.	EA	7		
a) Subtotal of Additive 1 Bid Items 1 - 3					
b) Construction Materials Testing Allowance					\$5,000.00
c) Add Alt 1: Total of Bid Items 1 – 3 and Materials Testing Allowance					
d) New Mexico Gross Receipts Tax @ 8.1875%					
e) Total Base Bid + Additive Alternate 1 Cost					

_____ Dollars

(Base Bid + Add Alt 1 Total Cost written in words)

BID BOND (DAMAGES FORM)

<p>Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i>: [Address of Bidder's principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i>: [Address of Surety's principal place of business]</p>
<p>Owner Name: City of Aztec Address <i>(principal place of business)</i>: 201 W. Chaco St., Aztec, NM 87410</p>	<p>Bid Project <i>(name and location)</i>: Aztec Reservoir #1 Improvements, Phase 2 Bid Due Date: [Enter date bid is due]</p>
<p>Bond Bond Amount: [Amount] Date of Bond: [Date]</p>	
<p>Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Bidder	Surety
<i>(Full formal name of Bidder)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i></p>	

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

SUBCONTRACTORS LISTING AND WSD (DOL) REGISTRATION

Project: Aztec Reservoir #1 Improvements, Phase 2

Project: ITB 2024-843

1.0 SUBCONTRACTORS LISTING FOR COMPLIANCE WITH THE SUBCONTRACTORS FAIR PRACTICES ACT AND WSD (DOL) REGISTRATION

1.1 To be fully executed and included with Bid as a condition of the Bid pursuant to §13-4-31 to 13-4-42 NMSA 1978, known as the Subcontractors Fair Practices Act.

1.2 Pursuant to §13-4-34 NMSA 1978 all Subcontractors providing services valued at \$20,000 or more (listing threshold) for this project shall be listed below.

1.3 See §13-4-36 NMSA 1978 for rules regarding changes in this list after bidding.

1.4 Pursuant to §13-4-13.1 NMSA 1978 any contractor or subcontractor that submits a bid valued at more than \$60,000 for a public works project subject to the Public Works Minimum Wage Act shall be registered with the Labor and Industrial Division of the Workforce Solutions Department (WSD) (formerly the Department of Labor (DOL)). The Owner shall not accept a bid on a public works project from a Contractor that does not provide proof of required registration for itself. Contractors, prime contractors and subcontractors must be registered with the WSD.

<u>Trade (list by trade)</u>	<u>Firm Name and Address</u>	<u>Workforce Solutions Dept. Registration No.</u>	<u>Dollar Value</u>
_____		WSD Registration No. _____	

_____		WSD Registration No. _____	

_____		WSD Registration No. _____	

_____		WSD Registration No. _____	

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

WSD Registration No. _____

[Use Additional Pages If

Necessary]

QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

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

1.02 Provide information on the Business’s organizational structure:

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

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

QUALIFICATIONS STATEMENT

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

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

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

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

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

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

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

QUALIFICATIONS STATEMENT

ARTICLE 4—SAFETY

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

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

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

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—SURETY INFORMATION

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

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

QUALIFICATIONS STATEMENT

ARTICLE 6—INSURANCE

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

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

ARTICLE 7—CONSTRUCTION EXPERIENCE

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

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

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

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

QUALIFICATIONS STATEMENT

Been a party to any currently pending litigation or arbitration? <input type="checkbox"/> Yes <input type="checkbox"/> No
Provide full details in a separate attachment if the response to any of these questions is Yes.

- 7.03 List all projects currently under contract in Schedule A and provide indicated information.
- 7.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.
- 7.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 8—REQUIRED ATTACHMENTS

- 8.01 Provide the following information with the Statement of Qualifications:
- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
 - B. Diverse Business Certifications if required by Paragraph 3.01.
 - C. Certification of Business's safety performance if required by Paragraph 4.02.
 - D. Financial statements as required by Paragraph 5.01.
 - E. Attachments providing additional information as required by Paragraph 8.02.
 - F. Schedule A (Current Projects) as required by Paragraph 8.03.
 - G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
 - H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
 - I. Additional items as pertinent.

QUALIFICATIONS STATEMENT

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

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

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address: _____

Phone: _____

Email: _____

QUALIFICATIONS STATEMENT

Schedule A—Current Projects

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

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

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

QUALIFICATIONS STATEMENT

Schedule B—Previous Experience with Similar Projects

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

QUALIFICATIONS STATEMENT

Schedule B—Previous Experience with Similar Projects

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

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

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

QUALIFICATIONS STATEMENT

Schedule C—Key Individuals

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

QUALIFICATIONS STATEMENT

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



STATE OF NEW MEXICO
Taxation and Revenue Department



APPLICATION FOR PREFERENCE

GENERAL INSTRUCTIONS PLEASE READ BEFORE COMPLETING

Sections 13-1-21 and 13-1-22 NMSA 1978 authorize and set forth the criteria required for a business to qualify as a Resident Business or Resident Contractor. It is important to note, a resident preference is applicable to contracts, which typically call for, but are not limited to, the furnishing of tangible personal property, i.e. goods, supplies, materials, equipment, printed materials and certain services.

A "resident preference" is applicable only to procurements made pursuant to a formal bid process or formal Request For Proposals (RFP) process in accordance with Sections 13-1-21 and 13-4-2 NMSA 1978. Additionally, any person, firm, corporation, or other legal entity must have all required licenses at the time the application for preference is submitted to the Taxation and Revenue Department for consideration.

Please note: All certifications are subject to revocation in accordance with applicable rules. A certification merely establishes that the Taxation and Revenue Department has determined based upon the information provided in the application, as of the date of issuance, that the holder was entitled to treatment as a resident business and/or contractor by state agencies and local public bodies.

The attached application for preference is required by Section 13-1-22 NMSA 1978 as amended during the First Special Legislative Session of 2011. The application includes an **affidavit from a certified public accountant** setting forth certain eligibility criteria for businesses or contractors, as required by Section 13-1-22 NMSA 1978. The completed **application along with payment of Thirty Five (\$35) dollars** must be submitted to the Taxation and Revenue Department prior to issuance of a resident business preference or a resident contractor preference certificate.

In addition to the application, the Taxation and Revenue Department may require submission of additional information to ensure eligibility.

A certificate is valid for three (3) years from the date of its issuance; provided that if there is a change of ownership of more than fifty percent, a resident business or resident contractor shall reapply.

For questions concerning the application process please call (505) 827-0951. The application along with payment should be sent to:

New Mexico Taxation and Revenue Department
Santa Fe District Office
PO Box 5374
Santa Fe, NM 87502-5374



STATE OF NEW MEXICO
Taxation and Revenue Department



APPLICATION FOR RESIDENT CONTRACTOR CERTIFICATION

General Information

For questions please call (505) 827-0951

Name of Business:		Doing Business As (DBA):	
Mailing Address:			
City:	State:	Zip:	
New Mexico Combined Reporting System (CRS) Identification Number:		FEIN/SSN:	
VIN of vehicle registered in New Mexico:		Name of vehicle owner:	

Choose one of the following contractor statuses and check the appropriate boxes that apply to your business. If any statement in this application is not appropriate to or does not otherwise describe your business, your business may not qualify for this preference.

Existing Contractor

- The contractor is currently licensed as a contractor in New Mexico and
- The contractor has paid property taxes on real property in New Mexico in each of the last five years or the business has paid rent on real property in New Mexico in each of the last five years and
- The contractor has paid another New Mexico State tax in each of the last five years and
- The contractor has paid unemployment insurance on a least three full-time New Mexico resident employees in each of the last five years or the contractor has been licensed as a contractor in New Mexico for ten consecutive years.

New Contractor

- The contractor is currently licensed as a contractor in New Mexico and
- Property Taxes on real property in New Mexico have been paid in each of the last five years by the owner or the majority of owners or the owner or majority of owners have paid rent on real property in New Mexico in each of the last five years and
- The owner(s) of the business have paid another New Mexico State tax in each of the last five years and
- This business has not applied for a Resident Business Certificate or Resident Contractors Certificate in each of the last five years.

Relocated Business

- The contractor is currently licensed as a contractor in New Mexico and
- The business has leased real property in New Mexico for the last ten years or the business has purchased real property in New Mexico valued at over \$100,000 and
- Eighty percent or more of the business employees in the prior year were residents of New Mexico.

Previously Certified Business or Purchased, Reorganized, Name changed Business

- The contractor is currently licensed, or was eligible for certification as a contractor in New Mexico or
- The business has reorganized into one or more different legal entities or the business was purchased by another legal entity, but operates in the same commercial enterprise or the business has merged with another legal entity, but operates in substantially the same commercial enterprise.

AFFIDAVIT FROM CERTIFIED PUBLIC ACCOUNTANT

STATE OF NEW MEXICO)				
COUNTY OF)				
I hereby swear, under oath that statements in the application for Resident Contractor Certification are true and complete to the best of my knowledge.				
Name:	Signature	CPA License #	State	Phone #
Subscribed and sworn to before me this _____ day of _____, 20____.				
My Commission Expires: _____				
Notary Public				

Send completed application Taxation and Revenue Department
along with \$35.00 to: PO Box 5374
Santa Fe, NM 87502-5374

Signature of Applicant

Date

NM Resident/Resident Veterans Preference Certification

_____ (Name of Business) hereby certifies the following regarding application of the resident veteran preference to this formal request for proposals process:

Preference will be given for NM Resident, NM Resident Veteran, NM Resident Native American, and NM Resident Native American Veteran contractors. These preferences are not cumulative and do not apply to contracts utilizing federal funds. See preference discounts below:

- NM Resident or NM Resident Native American Business = 8% preference
- NM Resident Veteran or NM Resident Native American Veteran = 10% preference

Please check both boxes:

I declare under penalty of perjury that my business prior year revenue starting January 1 ending December 31 is less than \$6M, allowing me the preference discount on this bid or proposal. I understand that knowingly giving false or misleading information about this fact constitutes a crime.

_____ (Name of Business) has obtained certification for the following preference: _____ (Qualified preference from list above) and requests to have the ____% preference applied.

"I agree to submit a report, or reports, to the State Purchasing Division of the General Services Department declaring under penalty of perjury that during the last calendar year starting January 1 ending December 31, the following to be true and accurate:

"In conjunction with this procurement and the requirements of this business' application for a Resident Preference/Resident Veteran Preference under Sections 13-1-21 or 13-1-22 NMSA 1978, when awarded a contract which was on the basis of having such resident preference, I agree to report to the State Purchasing Division of the General Services Department the awarded amount involved. I will indicate in the report the award amount as a purchase from a public body or as a public works contract from a public body as the case may be."

"I declare under penalty of perjury that this statement is true to the best of my knowledge. I understand that giving false or misleading statements about material fact regarding this matter constitutes a crime."

(Signature of Business Representative)*

(Date)

*Must be an authorized signatory for the Business.

The representation made in checking the boxes constitutes a material representation by the business that is subject to protest and may result in denial of an award or unaward of the procurement involved if the statements are proven incorrect.

Contractors wishing to obtain resident preference are required to submit a current Resident Business Preference Certificate issued by the NM Department of Taxation and Revenue. All preference numbers issued prior to January 1, 2012 are invalid. It is the sole responsibility of Bidders to obtain certification prior to the bid opening date. For additional information call 505-827-0951 or go to: <https://www.tax.newmexico.gov/businesses/business-preference-certification/>

**CERTIFICATION REGARDING
DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS**

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of all had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State Antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transaction (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be ground for rejection of this proposal or termination of the award. Under 18USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

NON-COLLUSION AFFIDAVIT

TO BE EXECUTED BY EACH AWARDEE OF A PRINCIPAL CONTRACT

)
)ss
)

_____, being first duly sworn, deposes and says that he is

(sole owner, a partner, president, secretary, etc.)

of _____
the party making the foregoing bid; that such a bid is not made in the interest of or on behalf of any undisclosed person, partnership, company association, organization, or corporation; that such a bid is genuine and not collusive or sham; that said bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirect colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, nor that anyone shall refrain from bidding; that said bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of said bidder or of any other bidder, nor to fix any overhead, profit, or cost element of such bid price, nor of that of any other bidder, nor to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in such bid are true; and, further, that said bidder has not directly or indirectly, submitted his bid price or any breakdown thereof, nor the contents thereof, nor divulged information or data relative thereto, nor paid and will not pay fee in connection therewith to any corporation, partnership, company, association, organization, bid depository, nor any member or agent thereof, nor any to any other individual except to such person or persons as have a partnership or other financial interest with said bidder in his general business.

Signed:

By _____

Title _____

Subscribed and sworn before me this _____ day of _____, 20

Seal of Notary

NOTARY PUBLIC

CAMPAIGN CONTRIBUTION DISCLOSURE FORM

Pursuant to the Procurement Code, Sections 13-1-28, et seq., NMSA 1978 and NMSA 1978, § 13-1-191.1 (2006), as amended by Laws of 2007, Chapter 234, any prospective Proposer seeking to enter into a contract with any state agency or local public body **for professional services, a design and build project delivery system, or the design and installation of measures the primary purpose of which is to conserve natural resources** must file this form with that state agency or local public body. This form must be filed even if the contract qualifies as a small purchase or a sole source contract. The prospective Proposer must disclose whether they, a family member or a representative of the prospective Proposer has made a campaign contribution to an applicable public official of the state or a local public body during the two years prior to the date on which the Proposer submits a proposal or, in the case of a sole source or small purchase contract, the two years prior to the date the Proposer signs the contract, if the aggregate total of contributions given by the prospective Proposer, a family member or a representative of the prospective Proposer to the public official exceeds two hundred and fifty dollars (\$250) over the two year period.

Furthermore, the state agency or local public body may cancel a solicitation or proposed award for a proposed contract pursuant to Section 13-1-181 NMSA 1978 or a contract that is executed may be ratified or terminated pursuant to Section 13-1-182 NMSA 1978 of the Procurement Code if: 1) a prospective Proposer, a family member of the prospective Proposer, or a representative of the prospective Proposer gives a campaign contribution or other thing of value to an applicable public official or the applicable public official's employees during the pendency of the procurement process or 2) a prospective Proposer fails to submit a fully completed disclosure statement pursuant to the law.

The state agency or local public body that procures the services or items of tangible personal property shall indicate on the form the name or names of every applicable public official, if any, for which disclosure is required by a prospective Proposer.

THIS FORM MUST BE INCLUDED IN THE REQUEST FOR PROPOSALS AND MUST BE FILED BY ANY PROSPECTIVE PROPOSER WHETHER OR NOT THEY, THEIR FAMILY MEMBER, OR THEIR REPRESENTATIVE HAS MADE ANY CONTRIBUTIONS SUBJECT TO DISCLOSURE.

The following definitions apply:

“Applicable public official” means a person elected to an office or a person appointed to complete a term of an elected office, who has the authority to award or influence the award of the contract for which the prospective Proposer is submitting a competitive sealed proposal or who has the authority to negotiate a sole source or small purchase contract that may be awarded without submission of a sealed competitive proposal.

“Campaign Contribution” means a gift, subscription, loan, advance or deposit of money or other thing of value, including the estimated value of an in-kind contribution, that is made to or received by an applicable public official or any person authorized to raise, collect or expend contributions on that official's behalf for the purpose of electing the official to statewide or local office. “Campaign Contribution” includes the payment of a debt incurred in an election campaign, but does not include the value of services provided without compensation or unreimbursed travel or other personal expenses of individuals who volunteer a portion or all of their time on behalf of a candidate or political committee, nor does it include the administrative or solicitation expenses of a political committee that are paid by an organization that sponsors the committee.

“Family member” means spouse, father, mother, child, father-in-law, mother-in-law, daughter-in-law or son-in-law of (a) a prospective Proposer, if the prospective Proposer is a natural person; or (b) an owner of a prospective Proposer.

“Pendency of the procurement process” means the time period commencing with the public notice of the request for proposals and ending with the award of the contract or the cancellation of the request for proposals.

“Prospective Proposer” means a person or business that is subject to the competitive sealed proposal process set forth in the Procurement Code or is not required to submit a competitive sealed proposal because that person or business qualifies for a sole source or a small purchase contract.

“Representative of a prospective Proposer” means an officer or director of a corporation, a member or manager of a limited liability corporation, a partner of a partnership or a trustee of a trust of the prospective Proposer.

Name(s) of Applicable Public Official(s) if any: **Mayor Michael A. Padilla Sr., Mayor Pro-Tem Kenneth B. George, Commissioners Austin R. Randall, Colby L. King, and Jim Crowley.**

(Completed by State Agency or Local Public Body)

DISCLOSURE OF CONTRIBUTIONS BY PROSPECTIVE PROPOSER:

Contribution Made By: _____

Relation to Prospective Proposer: _____

Date Contribution(s) Made: _____

Amount(s) of Contribution(s) _____

Nature of Contribution(s) _____

Purpose of Contribution(s) _____

(Attach extra pages if necessary)

Signature Date

Title (position)

--OR--

NO CONTRIBUTIONS IN THE AGGREGATE TOTAL OVER TWO HUNDRED FIFTY DOLLARS (\$250) WERE MADE to an applicable public official by me, a family member or representative.

Signature Date

Title (Position)

DRUG-FREE WORKPLACE CERTIFICATION

The Contractor named below hereby certifies to be in compliance with 49 CFR parts 40 and 382 by establishing a program designed to help prevent accidents and injuries resulting from the misuse of alcohol or use of controlled substances by drivers of commercial motor vehicles and to provide a workplace free of drug use and alcohol misuse. The below Contractor will:

1. Have in place a policy in compliance with 49 CFR Parts 40 and 382 that provides for pre-employment, post-accident, random, reasonable suspicion, return-to-duty, and follow-up testing for controlled substances and alcohol.
2. 49 CFR Part 382, section 382.603 requires that persons designated to supervise drivers receive at least 60 minutes of training on alcohol misuse and receive an additional 60 minutes of training on controlled substances use.
3. Have in place a drug free and alcohol-free workplace policy that applies to everyone that works on the project described in the contract. The drug free and alcohol-free workplace policy shall include an education and training program that informs employees about the following:
 - a. The dangers of drug use and alcohol misuse in the workplace.
 - b. The person's or organization's policy in maintaining a workplace free of drug use and alcohol misuse.
 - c. Any available counseling, rehabilitation, and employee assistance programs.
 - d. Penalties that may be imposed upon employees for violations; and,
 - e. Provisions for pre-employment and reasonable suspicion testing.
4. All of the contractor's employees who perform work on this project must be provided with a copy of the above referenced policies as those policies apply to them, i.e., not all employees are commercial drivers, but all employees would be subject to the drug-free and alcohol-free workplace policies.
5. That everyone who works on the contract agrees to abide by the terms of the Contractor's Statement as a condition of continued employment on the contract.
6. That no one who has tested positive within the past year will be allowed to perform work on this project.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above-described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of New Mexico

COMPANY NAME:	FEDERAL ID NUMBER:						
OFFICIAL'S NAME:							
OFFICIAL'S TITLE:	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; border: none;">WORKPLACE</td> <td style="width: 33%; border: none;">POLICY/PROGRAM</td> <td style="width: 33%; border: none;">DATE</td> </tr> <tr> <td colspan="3" style="border: none;">EXECUTED:</td> </tr> </table>	WORKPLACE	POLICY/PROGRAM	DATE	EXECUTED:		
WORKPLACE	POLICY/PROGRAM	DATE					
EXECUTED:							
OFFICIAL'S SIGNATURE:	EXECUTED IN THE COUNTY OF:						

NOTICE OF AWARD

Date of Issuance:

Owner: City of Aztec Owner’s Project No.: ITB 2024-843

Engineer: Bohannan Huston, Inc. Engineer’s Project No.: 20220380

Project: Aztec Reservoir #1 Improvements, Phase 2

Contract Name: Aztec Reservoir #1 Improvements, Phase 2

Bidder:

Bidder’s Address:

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

Demolition and disposal of 47,500 SF of existing concrete, demolition and disposal of the existing outlet tower structure , re-grading the existing reservoir slopes, installation of 138,000 SF of 60 mil HDPE liner, construction of a new outlet structure and access bridge, construction of a concrete access ramp, and installation of a new 20” inlet line.

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

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

Drawings will be delivered separately from the other Contract Documents.

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

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

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

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

Owner: City of Aztec

By (signature): _____

Name (printed): _____

Title: _____

Copy: Engineer

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

This Agreement is by and between City of Aztec (“Owner”) and [name of contracting entity] (“Contractor”).

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

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

Demolition and disposal of 47,500 SF of existing concrete, demolition and disposal of the existing outlet tower structure , re-grading the existing reservoir slopes, installation of 138,000 SF of 60 mil HDPE liner, construction of a new outlet structure and access bridge, construction of a concrete access ramp, and installation of a new 20” inlet line.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

The City of Aztec Reservoir #1 Improvements, Phase 2 project is in the City of Aztec in the County of San Juan, New Mexico. The work will take at the existing reservoir limits near Navajo Dam Rd. and Rd. 2960.

ARTICLE 3—ENGINEER

3.01 The Owner has retained Bohannon Huston, Inc. (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Bohannon Huston, Inc.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially complete within **210** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **240** days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 - 1. *Substantial Completion*: Contractor shall pay Owner \$1,500.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 - 2. *Completion of Remaining Work*: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,500.00 for each day that expires after such time until the Work is completed and ready for final payment.
 - 3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

- A. For all Work, a Contract Sum of \$[number].

The Contract Sum is determined as follows:

Base Bid	\$ _____
Alternates (if any)	\$ _____
NMGRT @ 8.1875%	\$ _____
Contract Sum	\$ _____

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the **25th** day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **100** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **200** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 - 1. This Agreement.
 - 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 - 3. General Conditions.
 - 4. Supplementary Conditions.
 - 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 - 6. Drawings identified as "Aztec Reservoir #1 Improvements".
 - 7. Addenda (numbers **[number]** to **[number]**, inclusive).
 - 8. Exhibits to this Agreement (enumerated as follows):
 - a. **Contractor's Bid**
 - 9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.

- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

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

8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

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

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

Owner:

City of Aztec
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

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

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

NOTICE TO PROCEED

Owner:	City of Aztec	Owner's Project No.:	ITB 2024-843
Engineer:	Bohannon Huston, Inc.	Engineer's Project No.:	20220380
Contractor:		Contractor's Project No.:	
Project:	Aztec Reservoir #1 Improvements, Phase 2		
Contract Name:	Aztec Reservoir #1 Improvements, Phase 2		
Effective Date of Contract:			

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

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

In accordance with the Agreement:

The number of days to achieve Substantial Completion is **210 days** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **240 days** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

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

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

Owner: City of Aztec

By (signature): _____

Name (printed): _____

Title: _____

Date Issued: _____

Copy: Engineer

PERFORMANCE BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p>
<p>Owner</p> <p>Name: City of Aztec</p> <p>Mailing address (<i>principal place of business</i>): 201 W. Chaco St., Aztec, NM 87410</p>	<p>Contract</p> <p>Description (<i>name and location</i>): Aztec Reservoir #1 Improvements</p> <p>Contract Price: [Amount from Contract]</p> <p>Effective Date of Contract: [Date from Contract]</p>
<p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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

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

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

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

PAYMENT BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p>
<p>Owner</p> <p>Name: City of Aztec</p> <p>Mailing address (<i>principal place of business</i>): 201 W. Chaco St., Aztec, NM 87410</p>	<p>Contract</p> <p>Description (<i>name and location</i>): Aztec Reservoir #1 Improvements</p> <p>Contract Price: [Amount, from Contract]</p> <p>Effective Date of Contract: [Date, from Contract]</p>
<p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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

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

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

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized and acting legal representative of the (agency) of City of Aztec do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the City of Aztec acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the City of Aztec; and that the foregoing agreements constitute valid and legally binding obligation upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Name: _____

Date: _____

Address: _____

Telephone No. (____) _____

Progress Estimate - Unit Price Work **Contractor's Application for Payment**

Owner: City of Aztec
 Engineer: Bohannon Huston, Inc.
 Contractor: _____
 Project: Reservoir #1 Improvements, Phase 2
 Contract: Reservoir #1 Improvements, Phase 2

Owner's Project No.: ITB-2024-843
 Engineer's Project No.: 20220380
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Bid Item No.	Description	Contract Information				Work Completed						Materials Currently Stored (not in J) (\$)	Work Completed and Materials Stored to Date (K + L) (\$)	% of Value of Item (M / F) (%)	Balance to Finish (F - M) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Quantity Completed Previous Period	Value Completed Previous Period	Quantity Completed This Period	Value Completed This Period	Value of Work Completed to Date (E X J) (\$)					
Base Bid															
1	Construction Surveying, Staking and As-Built Preparation, compl.	1.00	LS		-						-		-	-	
2	Construction Mobilization, compl.	1.00	LS		-						-		-	-	
3	Construction Demobilization, compl.	1.00	LS		-						-		-	-	
4	Construction Traffic Control & Barricading, compl.	1.00	LS		-						-		-	-	
5	NPDES compliance, development and implementation of Stormwater Pollution Prevention Plans and Water Control Plans, cip	1.00	LS		-						-		-	-	
6	Seeding: Hydro-mulch, cip.	1.00	AC		-										
7	Clearing and grubbing, compl.	2.50	AC		-										
8	Demolition and disposal of existing concrete lining, pipe penetrations, bollards, and all associated materials within reservoir limits including off-site hauling. Bollard demolition and disposal incidental to bid item.	47,500.00	SF												
9	Tower Abutment and Structure including excavation, backfill, subgrade prep, concrete, pipe penetrations, steel, and metal truss bridge, grating and paint, cip.	1.00	LS												
10	High Density HDPE Pond Liner, textured, 60 mil, to include all Penetration Seals, polylock strips and associated embedment/installation, anchor trenches and fill, concrete collars, removal and replacement of existing conduits, subgrade prep, compaction and installation, cip.	138,000.00	SF												
11	Structural concrete for access ramp and ramp footing: 4000 psi with #4 rebar, and Xypex C-500 admixture or approved equal. To include formwork, labor and installation. See detail 1, DWG D-03. Including excavation, backfill, and compaction cip.	190.00	CY												
12	Subgrade Prep. 12" at 95% compaction, cip.	950.00	SY		-						-		-		
13	Aggregate Base Course, crushed, 4" thick at 95% compaction, cip.	200.00	SY												
14	24" Layer of Sand, including delivery and installation	3,700.00	CY		-						-		-		

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: City of Aztec
 Engineer: Bohannon Huston, Inc.
 Contractor: _____
 Project: Reservoir #1 Improvements, Phase 2
 Contract: Reservoir #1 Improvements, Phase 2

Owner's Project No.: ITB-2024-843
 Engineer's Project No.: 20220380
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A Bid Item No.	B Description	Contract Information				Work Completed						L Materials Currently Stored (not in J) (\$)	M Work Completed and Materials Stored to Date (K + L) (\$)	N % of Value of Item (M / F) (%)	O Balance to Finish (F - M) (\$)
		C Item Quantity	D Units	E Unit Price (\$)	F Value of Bid Item (C X E) (\$)	G Quantity Completed Previous Period	H Value Completed Previous Period	I Quantity Completed This Period	J Value Completed This Period	K Value of Work Completed to Date (E X J) (\$)					
15	Cut/Fill earthwork, including excavation, backfill and compaction, and grading. Suitable on-site material may be used for fill. CIP at 95% compaction.	8,900.00	CY		-						-		-		
16	Borrow, backfill and compaction of suitable fill material when not obtained from within limits of construction (hauling) CIP at 95% compaction	4,000.00	CY		-						-		-		
17	Haul and disposal of unsuitable site soils and excess material including clay, complete in place	4,120.00	CY		-										
18	New pipe for re-installation of existing pipe penetrations to include all necessary material, pipe, fittings, transition couplings, restraints, backfill and compaction. (Approximately 60 LF of 30" PVC, and 50 LF of 15" PVC) Transition to existing pipe material, contractor to field verify. Complete in place.	1.00	LS		-										
19	Temporary Removal of 6" piping, and re-installation following construction activities. To include all necessary materials, fittings, restraints, backfill, and compaction. Complete in place.	30.00	LF		-										
20	20-inch Suction ductile iron pipe including fittings, restraints, reducers, trenching, backfill and compaction, all depths, cip.	260.00	LF		-										
21	20-inch Dia. Gate Valve , cip. SD2326 with Box and Cover (NMPWSS STD DWG 2326)	1.00	EA		-										
22	Temporary Removal of site fencing and re-installation following construction activities, cip.	1,420.00	LF												
23	Headwall Slide gate, including all associated fittings, fabrication, labor, installation, and leak testing cip.	2.00	EA												
24	Pre-Cast Concrete Grade Control Indicator, including 5' x 5' secondary HDPE liner layer, installation and labor cip.	7.00	EA												
25	Electrical Improvements including trenching and backfill for underground conduit, underground pull boxes, conduit/conductor, work in existing panelboard, equipment	1.00	LS												
26	Fabricate control panels, including all required components	1.00	LS												

Progress Estimate - Unit Price Work											Contractor's Application for Payment				
Owner:		City of Aztec									Owner's Project No.:		ITB-2024-843		
Engineer:		Bohannon Huston, Inc.									Engineer's Project No.:		20220380		
Contractor:											Contractor's Project No.:				
Project:		Reservoir #1 Improvements, Phase 2													
Contract:		Reservoir #1 Improvements, Phase 2													
Application No.:		Application Period:		From		to		Application Date:							
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Bid Item No.	Description	Contract Information				Work Completed						Materials Currently Stored (not in J) (\$)	Work Completed and Materials Stored to Date (K + L) (\$)	% of Value of Item (M / F) (%)	Balance to Finish (F - M) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Quantity Completed Previous Period	Value Completed Previous Period	Quantity Completed This Period	Value Completed This Period	Value of Work Completed to Date (E X J) (\$)					
27	SCADA integration including work required in existing RTU and required components. Programming necessary to integrate reservoir instrumentation into existing system	1.00	LS												
28	Reservoir instrumentation, including installation and integration into existing SCADA system.	1.00	LS												
Additive Alternate #1															
1	2" Air Release Valve, including manhole & lid, trenching, backfill, and compaction, any depth, cip.	3.00	EA		-					-		-		-	
2	3" Air release Valve, including manhole & lid, trenching, backfill, and compaction, any depth, cip.	4.00	EA		-					-		-		-	
3	Removal and disposal of existing Air Release Valve, all sizes, any depth, cip.	7.00	EA		-					-		-		-	
Original Contract Totals					\$	-					\$	-		\$	-

Progress Estimate - Unit Price Work **Contractor's Application for Payment**

Owner: City of Aztec
 Engineer: Bohannon Huston, Inc.
 Contractor: _____
 Project: Reservoir #1 Improvements, Phase 2
 Contract: Reservoir #1 Improvements, Phase 2

Owner's Project No.: ITB-2024-843
 Engineer's Project No.: 20220380
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Bid Item No.	Description	Contract Information				Work Completed						Materials Currently Stored (not in J) (\$)	Work Completed and Materials Stored to Date (K + L) (\$)	% of Value of Item (M / F) (%)	Balance to Finish (F - M) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Quantity Completed Previous Period	Value Completed Previous Period	Quantity Completed This Period	Value Completed This Period	Value of Work Completed to Date (E X J) (\$)					
Change Orders															
					-					-		-		-	
					-					-		-		-	
					-					-		-		-	
					-					-		-		-	
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					-					-		-		-	
					-					-		-		-	
Change Order Totals					\$	-					\$	-		\$	-
Original Contract and Change Orders															
Project Totals					\$	-					\$	-		\$	-

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of Aztec Owner's Project No.: ITB 2024-843
Engineer: Bohannan Huston, Inc. Engineer's Project No.: 20220380
Contractor: Contractor's Project No.:
Project: Aztec Reservoir #1 Improvements, Phase 2
Contract Name: Aztec Reservoir #1 Improvements, Phase 2

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

Demolition and disposal of 47,500 SF of existing concrete, demolition and disposal of the existing outlet tower structure, re-grading the existing reservoir slopes, installation of 138,000 SF of 60 mil HDPE liner, construction of a new outlet structure and access bridge, construction of a concrete access ramp, and installation of a new 20" inlet line.

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

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

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

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

Amendments to Owner's Responsibilities: None As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

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

[List attachments such as punch list; other documents]

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By (signature): _____

Name (printed): _____

Title: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

1.02 Terminology

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

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

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

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

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

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

2.05 *Acceptance of Schedules*

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

2.06 *Electronic Transmittals*

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

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

3.02 *Reference Standards*

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Requirements of the Contract Documents*

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

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

3.05 *Reuse of Documents*

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

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

4.04 *Progress Schedule*

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

4.05 *Delays in Contractor's Progress*

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

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

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

5.01 *Availability of Lands*

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

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

5.02 *Use of Site and Other Areas*

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

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

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

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

5.03 *Subsurface and Physical Conditions*

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

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

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

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

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

5.05 *Underground Facilities*

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

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

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

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

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

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

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

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

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

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

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

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

6.02 *Insurance—General Provisions*

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

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

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

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

6.03 *Contractor's Insurance*

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

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

6.04 *Builder's Risk and Other Property Insurance*

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

6.05 *Property Losses; Subrogation*

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

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

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

6.06 *Receipt and Application of Property Insurance Proceeds*

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

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

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

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

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

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

7.04 *Services, Materials, and Equipment*

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

7.05 *"Or Equals"*

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

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

7.06 *Substitutes*

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

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

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

7.07 *Concerning Subcontractors and Suppliers*

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

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

7.08 *Patent Fees and Royalties*

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

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

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

7.12 *Record Documents*

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

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

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

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

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

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

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

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

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

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

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

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

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

10.03 *Resident Project Representative*

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

10.04 *Engineer's Authority*

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

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

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

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

11.02 *Change Orders*

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

11.03 *Work Change Directives*

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

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

11.04 *Field Orders*

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

11.05 *Owner-Authorized Changes in the Work*

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

11.06 *Unauthorized Changes in the Work*

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

11.07 *Change of Contract Price*

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

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

11.08 *Change of Contract Times*

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

11.09 *Change Proposals*

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

B. *Change Proposal Procedures*

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

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

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

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

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

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

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

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

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

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

13.01 *Cost of the Work*

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

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

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

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

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

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

D. *Contractor's Fee*

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

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

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

13.02 Allowances

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

13.03 Unit Price Work

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

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

E. *Adjustments in Unit Price*

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

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

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

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

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

14.03 *Defective Work*

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

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

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

14.06 *Owner May Stop the Work*

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

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

14.07 Owner May Correct Defective Work

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

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

15.01 Progress Payments

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

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

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

C. *Review of Applications*

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

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

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

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

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

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

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

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

15.04 *Partial Use or Occupancy*

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

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

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

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

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

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

15.07 *Waiver of Claims*

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

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

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

15.08 *Correction Period*

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

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

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

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

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

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

16.03 *Owner May Terminate for Convenience*

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

16.04 *Contractor May Stop Work or Terminate*

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

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

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

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

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

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

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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

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

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

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01 Add the following language at the end of the last sentence of Paragraph 1.01.A.8:

The Change Order form to be used on this Project is EJCDC C-941. Agency approval is required before Change Orders are effective.

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

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. *Evidence of Owner's Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor **5** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and **one copy** in electronic portable document format (PDF).

2.06 *Electronic Transmittals*

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.
2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:
 - a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.
 - b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.
 - c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.
 - d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.
3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis (at

§[number] per hour) for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No suggested Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

SC-4.01.A Amend the last sentence of Paragraph 4.01.A by striking out the following words:

In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.05 *Delays in Contractor's Progress*

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

5. *Weather-Related Delays*

- a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.
- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
 - 1) Conditions of extreme or unusual weather for a given region, elevation, or season as determined by Engineer. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered Abnormal Weather Conditions.

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

5.03 *Subsurface and Physical Conditions*

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

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

Report Title	Date of Report	Technical Data
N/A		

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

Drawings Title	Date of Drawings	Technical Data
N/A		

5.06 *Hazardous Environmental Conditions*

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

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

B. Not Used.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

SC-6.01 Add the following paragraph after Paragraph 6.01.G:

H. Non-Resident Contractor's Requirements Regarding Gross Receipts Tax Surety Bond

1. Section 7-1-55A NMSA 1978 provides that any person (as defined in 7-1-3 NMSA 1978) engaged in the construction business who does not have his principal place of business in New Mexico and enters into a prime construction contract to be performed in this state shall, at the time such contract is entered into, furnish the Director of the Revenue Division, Taxation and Revenue Department, or his delegate with a surety bond or other acceptable security in a sum equivalent to the gross receipts tax to be paid under the contract multiplied by the applicable rate of the gross receipts tax imposed by 7-9-4 NMSA 1978 to secure payment of the tax imposed on the gross receipts from the contract, and shall obtain a certificate from the Director of the Revenue Division, Taxation and Revenue Department, or his delegate, that the requirements of this paragraph have been met.
2. If the total sum to be paid under the contract is changed by ten percent or more after the date the surety bond or other acceptable security is furnished, to the Director or his delegate, such person shall increase or decrease, as the case may be, the amount of the bond or security within fourteen days after the change (7-1-55B NMSA 1978).

3. In addition to the above requirements, the Contractor will be subject to all the requirements of 7-1-55 NMSA 1978.

6.02 *Insurance—General Provisions*

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

1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.

6.03 *Contractor’s Insurance*

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

D. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

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

State: Statutory

Federal, if applicable (e.g., Longshoreman’s) Statutory

Jones Act coverage, if applicable:

Bodily injury by accident, each accident \$ N/A

Bodily injury by disease, aggregate \$ N/A

Employer’s Liability:

Bodily injury, each accident \$100,000

Bodily injury by disease, each \$100,000

Bodily injury/disease aggregate \$500,000

For work performed in monopolistic states, stop- gap liability coverage shall be endorsed to either the worker’s compensation or commercial general liability policy with a minimum limit of: \$ N/A

Foreign voluntary worker compensation Statutory

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

General Aggregate \$2,000,000

Products - Completed Operations Aggregate \$1,000,000

Personal and Advertising Injury \$1,000,000

Each Occurrence (Bodily Injury and Property Damage) \$1,000,000

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

Bodily Injury:

Each person \$500,000

Each accident \$1,000,000

Property Damage:

Each accident

[or]

Combined Single Limit of

4. Excess or Umbrella Liability:

Per Occurrence \$ ___

General Aggregate \$1,000,000

5. Contractor's Pollution Liability:

Each Occurrence \$ N/A

General Aggregate \$ N/A

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

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: N/A

7. Contractor's Professional Liability:

Each Claim \$

Annual Aggregate \$

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "...all Work at the Site must be performed during regular working hours, Monday through Friday from 7:00 a.m. to 7:00 p.m. Contractor will not perform Work on any legal holiday."

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

D. **Contractor** shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree

as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

7.05 *"Or Equals"*

SC-7.05 Amend the third sentence of Paragraph 7.05.A by striking out the following words:

Unless the specification or description contains or is followed by words reading that no like, equivalent, or 'or-equal' item is permitted.

SC-7.05 Amend the last sentence of Paragraph 7.05.A.1.a.3 by striking out "and" and adding a period at the end of Paragraph a.3.

SC-7.05 Delete Paragraph 7.05.A.1.a.4 in its entirety and insert the following in its place:

[Deleted]

7.07 *Concerning Subcontractors and Suppliers*

SC-7.07 Amend Paragraph 7.07.A by adding the following text to the end of the Paragraph:

The Contractor shall not award work valued at more than fifty percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.07 Delete paragraph 7.07.B in its entirety and insert the following in its place:

[Deleted]

SC-7.07 Amend the second sentence of Paragraph 7.07.E by striking out "Owner may also require Contractor to retain specific replacements; provided, however, that".

7.09 *Permits*

SC-7.09 Add the following new paragraph immediately after Paragraph 7.09.A:

B. This Contract is subject to the provisions of the New Mexico Construction Industries Licensing Act (60-13-1 to 60-13-59 NMSA 1978), the rules and regulations of the New Mexico Construction Industries Commission and the rules, regulations and codes of the various trade boards adopted pursuant to the Construction Industries Licensing Act.

7.10 *Taxes*

SC-7.10 Add the following new paragraphs immediately after Paragraph 7.10.A:

B. Contractor's Gross Receipts Tax Registration

1. 7-10-4 NMSA 1978 provides that any person (as defined in 7-10-3 NMSA 1978) performing services for the state or its political subdivisions, as those terms are used in the Gross Receipts and Compensating Tax Act (7-10-1 through 7-10-5 NMSA 1978) must be registered and be issued an identification number with the Revenue Division of the Taxation and Revenue Department of the state to pay the gross receipts tax.
2. For information in obtaining the identification number contact: Revenue Processing Division, Taxation and Revenue Department, Manuel Lujan Sr. Building, 1200 St. Francis Drive, Santa Fe, New Mexico 87503, or call (505)827-0825.
3. If any person who performs services for the State or its political subdivisions is not registered to pay the gross receipts tax, the Owner shall withhold payment of the amount due until the

person has presented evidence of registration with the Revenue Division to pay the gross receipts tax.

7.11 *Laws and Regulations*

SC-7.11 Add the following new paragraph immediately after Paragraph 7.11.C:

D. Contracts With Nonresident Persons Or Partnerships Or Unadmitted Foreign Corporations, Agent For Service Of Process: Special attention of Contractors is called to the requirements of 13-4-21 through 13-4-24 NMSA 1978, whereby a public works contract with a nonresident person or partnership or foreign corporation not authorized to do business in the State shall contain a specific provision designating an agent resident within the State, and his address, upon whom process and writs in any action or proceeding against such business may be served in any action arising out of such contract.

Add SC-7.20 *Minimum Wage Rates*

SC-7.20 Add the following new paragraphs:

- A. The Contractor warrants and agrees that he and all subcontractors shall comply with all applicable provisions of the New Mexico Public Works Minimum Wage Act, 13-4-11 NMSA 1978, if the project is over \$60,000; and other statutes pertaining to public works in New Mexico. The attached Minimum Wage Rate Determinations are declared to be prevailing and apply to the construction.
- B. Submission of weekly payroll records to the Owner and Labor Commission is mandatory. Include the decision number on Contractor's and subcontractor's payrolls. The scale of wages shall also be posted in a prominent location at the site.
- C. In the event it is found by the Labor Commission, that any laborer or mechanic employed by the Contractor or Subcontractor on the site of the project covered by this Contract, has been or is being paid as a result of a willful violation, a rate of wages less than the rate of wages required by the Contract, the Owner may, by written notice to the Contractor and his subcontractor, if the violation involves a Subcontractor, terminate their right to proceed with the Work or such part of the Work as to which there has been a willful failure to pay the required wages and the Owner may prosecute the Work to completion by contract or otherwise, and the Contractor shall be liable to the Owner and the State of New Mexico for any excess cost occasioned thereby.

ARTICLE 8—OTHER WORK AT THE SITE

No suggested Supplementary Conditions in this Article.

ARTICLE 9—OWNER'S RESPONSIBILITIES

No suggested Supplementary Conditions in this Article.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

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

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 3. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 4. *Liaison:*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 5. *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.
 6. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
 7. *Modifications:* Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
 8. *Review of Work; Defective Work:*

- a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
9. *Inspections and Tests:*
- a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 - c. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintain adequate records thereof.
10. *Records:*
- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, 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.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.
11. *Reports:*
- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
 - c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
12. *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. The Engineer will verify record

drawings are kept current within 30 days and that the Owner is receiving weekly certified payroll from the Contractor.

13. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. *Completion*

- a. Participate in Engineer's visits regarding Substantial Completion.
- b. Assist in the preparation of a punch list of items to be completed or corrected.
- c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
- d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

11.02 *Change Orders*

SC-11.02 Add the following new Paragraph after Paragraph 11.02.B:

All Contract Change Orders must be concurred in by Agency before there are effective.

ARTICLE 12—CLAIMS

No suggested Supplementary Conditions in this Article.

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

13.02 Allowances

SC-13.02 Delete Paragraph 13.02.C in its entirety and insert the following in its place:

Allowance for Construction Materials Testing. A Construction Materials Testing Allowance is included in the Bid Proposal to pay for field and laboratory testing of construction materials as required by the Contract Documents. Such testing of construction materials will include, but not be limited to, compaction testing of embankments, subgrade, base course and pavements, strength testing of Portland cement concrete and asphalt concrete, and laboratory tests associated with construction materials.

The Contractor shall hire a subcontractor (Testing Agency) to perform the construction material testing. The Testing Agency shall be an approved testing laboratory and construction materials testing shall be performed under the direct supervision of a Professional Engineer licensed to practice engineering in the State of

New Mexico. The Owner will reimburse the Contractor the actual cost for all such construction materials testing based on invoices received from the Testing Agency.

The Owner will reimburse the Contractor for initial tests to establish that the work has been performed in compliance with the Contract Documents. In the event the initial testing shows defective work, materials, supplies or equipment, all subsequent testing shall be at the Contractor's sole expense.

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

No suggested Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 Progress Payments

This contract provides for payment to be made longer than 21 days.

SC-15.01 Add the following new Paragraph after Paragraph 15.01.B.3:

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

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

The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. This contract allows the Owner to make payment within 45 (not to exceed 45 days) days after submission of an undisputed request for payment (Section 57-28-5 B (2) NMSA 1978).

15.02 Contractor's Warranty of Title

SC-15.02 Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by Owner" and insert "no later than the time of payment by Owner."

15.03 Substantial Completion

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

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.06 *Final Payment*

SC-15.06 Add the following language to Paragraph 15.06.D:

1. Final payment will be made 45 days after submission of an undisputed pay request.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

SC-17.02 *Attorneys' Fees*

Add the following new Paragraph immediately after Paragraph 17.01.

SC-17.02: *Attorneys' Fees*

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18—MISCELLANEOUS

No suggested Supplementary Conditions in this Article.

CHANGE ORDER NO.: [Number of Change Order]

Owner: City of Aztec
 Engineer: Bohannan Huston, Inc.

Owner's Project No.: ITB 2024-843
 Engineer's Project No.: 20220380
 Contractor's Project

Contractor:
 Project: Aztec Reservoir #1 Improvements, Phase 2
 Contract Name: Aztec Reservoir #1 Improvements, Phase 2
 Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

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

Recommended by Engineer (if required)

Authorized by Owner

By: _____

Title: _____

Date: _____

Authorized by Owner

Approved by Funding Agency

By: _____

Title: _____

Date: _____

NON-APPROPRIATIONS CLAUSE

Article XV: “The terms of this Agreement are contingent upon sufficient appropriations and authorization being made by the Legislature of New Mexico for the performance of this Agreement. If sufficient appropriations and authorization are not made by the Legislature, The City of Aztec may immediately terminate this Agreement by giving Contractor written notice of such termination. The City of Aztec’s decision as to whether sufficient appropriations are available shall be accepted by the Contractor and shall be final. Contractor hereby waives any rights to assert an impairment of contract claim against the City of Aztec or the Office of the State Engineer or the State of New Mexico in the event of immediate or Early Termination of this Agreement by the City of Aztec or the Department.”

Article XVI: “This contract is funded in whole or in part by funds made available under an Office of the State Engineer Grant Agreement. Should the Office of the State Engineer early terminate the grant agreement, The City of Aztec may early terminate this contract by providing Contractor written notice of such termination. In the event of termination pursuant to this paragraph, the City of Aztec’s only liability shall be to pay Contractor for acceptable goods delivered and services rendered before the termination date.”

Grantee hereby waives any rights to assert an impairment of contract claim against the Department or the State of New Mexico in the event of Early Termination of this Agreement by the Department.

Signature (Contractor)

Date

Title



STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

PUBLIC WORKS PROJECT REQUIREMENTS

As a participant in a Public Works project valued at more than \$60,000 in the State of New Mexico, the following list addresses many of the responsibilities that are defined by statute or regulation to each project stakeholder.

Contracting Agency

- Ensure that all Contractors wishing to bid on a Public Works project when the project is \$60,000 or more are actively registered with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> (Contractor Registration) prior to bidding.
- Please submit Notice of Award (NOA) and Subcontractor List(s) to the PWAA website promptly after the project is awarded.
- Please update the Subcontractor List(s) on the PWAA website whenever changes occur.
- All Sub-Contractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.
- Ninety days after project completion please go into the PWAA system and close the project. Only Contracting Agencies are allowed to close the project. Agents or Contractors are not allowed to close projects.

General Contractor

- Provide a complete Subcontractor List and Statements of Intent (SOI) to Pay Prevailing Wages for all Contractors, regardless of amount of work, to the Contracting Agency within 3 (three) days of award.
- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> prior to bidding when their bid will exceed \$60,000.
- Submit weekly certified payroll bi-weekly to the Contracting Agency.
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- Confirm the Wage Rate poster, provided in PWAA, is displayed at the job site in an easily accessible place.
- Make sure, when a project has been completed, the Affidavits of Wages Paid (AWP) are sent to the Contracting Agency.



STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
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- All Subcontractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.

Subcontractor

- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> prior to bidding when their bid will exceed \$60,000.
- Submit weekly certified payroll bi-weekly to the General Contractor(s).
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- All Subcontractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.

Additional Information

Reference material and forms may be found at New Mexico Department of Workforce Solutions Public Works web pages at: <https://www.dws.state.nm.us/Labor-Relations/Labor-Information/Public-Works>.

CONTACT INFORMATION

Contact the Labor Relations Division for any questions relating to Public Works projects by email at public.works@dws.nm.gov or call (505) 841-4400.



2023 SUBSISTENCE, ZONE AND INCENTIVE PAY RATES

All contractors are required to pay subsistence, zone, and incentive pay according to the particular trade

Asbestos workers or heat and frost insulators

- (1) Zone 1 shall consist of the area lying within the city limits of a circle whose radius is 66 miles from the city hall in Albuquerque or the city hall in El Paso - \$0.00 per day.
- (2) Zone 2 shall consist of Los Alamos county - \$40.00 per day if not furnished a company owned vehicle.
- (3) Zone 3 shall consist of the area lying beyond a circle whose radius is over 66 miles from the city hall in Albuquerque or the city hall in El Paso - \$85.00 per day.

Boilermakers/Blacksmiths

- (1) Per diem is calculated from city hall of the dispatch city or the employee's home address, whichever is closer to the job location,
- (2) Per diem is \$55.00 per day for travel between 70 and 120 miles and \$85.00 per day for travel over 120 miles.

Bricklayers

- (1) Between 70 and 120 miles, \$55.00 per day
- (2) 121 or more miles, \$70.00 per day

Cement Masons

- (1) For employees who travel to Santa Fe from Albuquerque or vice versa, \$20.00 per day.
- (2) In all other work performed more than 50 miles from the employer's main office, \$50.00 per day.
- (3) Mutually agreed-upon lodging or transportation paid for by the employer will substitute for subsistence pay.

Drywall Finishers and Tapers

- (1) \$40.00 per day (\$5.00 per hour for eight hours work) for over 60 miles over the most typically traveled route, or other mutually agreed upon suitable lodging or transportation.
- (2) If an employee has worked the full week on four 10-hour days, the employee shall be paid the full week of per diem of \$200.00.
- (3) Special provision for Santa Fe and Albuquerque: Employees who travel between Santa Fe and Albuquerque will be paid \$15.00 per day or other mutually agreed upon lodging or transportation.



Electricians (inside classifications)

- (1) For Albuquerque only:
 - (a) Zone 1 is classified as being within 40 miles from the main post office.
 - (b) Zone 2 shall extend up to 10 miles beyond zone 1. Work performed within zone 2 shall be compensated nine percent above the journeyman rate for zone 1.
 - (c) Zone 3 shall extend up to 20 miles beyond zone 1. Work performed within zone 3 shall be compensated fifteen percent above the journeyman rate for zone 1.
 - (d) Zone 4 shall extend 20 miles or more beyond zone 1. Work performed within zone 4 shall be compensated twenty six percent above the journeyman rate for zone 1.
- (2) For Los Alamos County only: work performed within the county shall be compensated fifteen percent above the zone 1 journeyman rate.
- (3) For all other counties:
 - (a) Zone 1 is:
 - (i) within six miles from the main post office for Raton, Tucumcari, and Farmington.
 - (ii) within eight miles from the main post office for Las Vegas.
 - (iii) within ten miles from the main post office for Santa Fe and Gallup.
 - (iv) within twelve miles from the main post office for Belen, Carrizozo, Clovis, Los Lunas, Portales, Roswell, Ruidoso, Artesia, Carlsbad, Hobbs, and Lovington.
 - (v) within fourteen miles from the main post office for Espanola.
 - (b) Zone 2 shall extend up to 20 miles beyond zone 1. Work performed within zone 2 shall be compensated nine percent above the journeyman rate for zone 1.
 - (c) Zone 3 shall extend up to 30 miles from zone 1. Work performed within zone 3 shall be compensated fifteen percent above the journeyman rate for zone 1.
 - (d) Zone 4 shall extend beyond 30 miles from zone 1. Work performed within zone 4 shall be compensated twenty six percent above the journeyman rate for zone 1.
- (4) When workers are ordered to report to the shop and then to the job and from job to job, and return to the shop, they shall be paid for the time spent traveling and shall be furnished transportation by the Employer. Under these conditions the Zone 1 rate and any applicable overtime will be paid.

Electricians (outside classification)

Zone 2: \$50.00 per diem to be paid for work 30 miles outside of Santa Fe and 60 miles outside of Albuquerque. No per diem in Los Alamos county.



Glaziers

- (1) When out-of-town travel is required, the employer shall pay the employee for suitable lodging with no more than two people per room and \$20.00 per night for food.
- (2) Employees required to use a personal vehicle for travel to a jobsite beyond a 30 mile radius of the main post office in town where the employer's shop is located shall be compensated at the current Internal Revenue Service (IRS) rate for actual mileage incurred beyond the 30 mile radius, plus their regular rate of pay for travel time.

Ironworkers

- (1) Travel more than 50 miles from the interchange of Interstate 40 and Interstate 25 or from the employee's home should be paid at \$9.00 per hour.
- (2) If travel is within Santa Fe county, travel time shall be paid at \$3.00 per hour.

Laborers

- (1) Type A:
 - (a) Work travel between 50 and 85 miles from the employer's primary address should be compensated at \$3.50 per hour.
 - (b) Work travel 86 miles or greater from the employer's primary address should be compensated at \$5.00 per hour.
- (2) Types B and C:
 - (a) Work travel under 50 miles is a "free zone";
 - (b) The municipal limit of the city of Santa Fe is \$30.00 per day;
 - (c) Work travel between 50 and 75 miles from the union hall to include the municipal limits of Estancia, Grants, and Socorro is \$40.00 per day.
 - (d) All work over 75 miles from the union hall is \$50.00 per day.
- (3) Type H – no zone subsistence pay:
- (4) If an employer provides the employee transportation and mutually agreeable, suitable lodging in areas where overnight stays are necessary, subsistence rates do not apply.

Millwrights

- (1) Work travel between 76 and 150 miles should be compensated at \$50.00 per day.
- (2) Work travel greater than 150 miles should be compensated at \$75.00 per day.

Operating Engineers

- (1) Type A operators should be compensated for zone and subsistence as follows:
 - (a) Work travel between 50 and 85 miles from the interchange of Interstate 25 and Interstate 40 in Albuquerque, or from the Farmington City Hall in Farmington, should be compensated at \$2.50 per hour.
 - (b) Work travel 86 miles or more from the interchange of Interstate 25 and Interstate 40 in Albuquerque or from the Farmington City Hall in Farmington, should be compensated at \$4.00 per hour.
- (2) Type B and C operators:
 - (a) Base points for operators are 30 miles and beyond:
 - (i) Bernalillo county courthouse in Albuquerque;
 - (ii) State capital building in Santa Fe;
 - (iii) City hall in Farmington.
 - (b) Zone and subsistence for Albuquerque and Santa Fe are as follows:
 - (i) work travel between 30 and 50 miles from the base point compensated at \$20.00 per day;
 - (ii) work travel between 51 and 100 miles from the base point compensated at \$45.00 per day;
 - (iii) work travel over 100 miles from the base point that involves an overnight stay compensated at \$75.00 per day.
 - (c) Zone and subsistence for Los Alamos county, \$50.00 per day.
 - (d) Zone and subsistence for Farmington is as follows:
 - (i) work travel between 35 and 75 miles from the base point compensated at \$45.00 per day,
 - (ii) work travel over 100 miles from the base point compensated at \$75.00 per day.
 - (e) If an employer provides the employee transportation and mutually agreeable, suitable lodging in areas where overnight stays are necessary, subsistence rates do not apply.
- (3) Type H operators are not eligible for zone and subsistence pay.

Painters

- (1) Zone 1: Base pay for an area within a 30 mile radius from the main post office in the city or town where the employee permanently resides. Albuquerque, Santa Fe, and Belen shall be considered Zone I.
- (2) Zone 2: Work travel between 30 and 75 miles from the main post office in the town where an employee permanently resides shall be compensated at \$1.00 per hour above base pay.
- (3) Zone 3: Work travel 75 miles or more from the main post office in the town where an employee permanently resides shall be compensated at \$2.50 per hour above base pay.



- (4) When the employee is required to stay overnight, the employer should provide and pay for suitable lodging.
- (5) Employer will furnish transportation or gasoline for all work performed beyond the 30 mile radius that encompasses the free cities of Albuquerque, Santa Fe or Belen.

Paper hangers

- (1) Zone 1: Base pay for an area within a 30 mile radius from the main post office in the city or town where the employee permanently resides. Albuquerque, Santa Fe, and Belen shall be considered Zone I.
- (2) Zone 2: Work travel between 30 and 75 miles from the main post office in the town where an employee permanently resides shall be compensated at \$1.00 per hour above base pay.
- (3) Zone 3: Work travel 75 miles or more from the main post office in the town where an employee permanently resides shall be compensated at \$2.50 per hour above base pay.
- (4) When the employee is required to stay overnight, the employer should provide and pay for suitable lodging.
- (5) Employer will furnish transportation or gasoline for all work performed beyond the 30 mile radius that encompasses the free cities of Albuquerque, Santa Fe or Belen.

Plasterers

- (1) Employees who travel from Albuquerque to Santa Fe should be compensated at \$20.00 per day.
- (2) Except for employees who travel from Santa Fe to Albuquerque, work travel 75 miles or more from the employer's office over the most typically traveled route should be compensated at \$5.00 per hour and capped at \$40.00 per day.

Plumbers and pipefitters

- (1) Work travel for 90 or more miles from an employee's primary residence, and involving an overnight stay, should be compensated at \$80.00 per day.
- (2) No zone or subsistence pay is required should the employer elect to cover the room cost.
- (3) Los Alamos county workers receive \$0.80 per hour incentive pay plus base and fringe.

Roofers

Work travel requiring an overnight stay should be compensated at \$35.00 per day for food. Employer should provide and pay for a suitable hotel. When employees are assigned to jobs located 60 or more miles from the employer's place of business, transportation to and from the job site must be provided.



Sheet metal workers

- (1) Work travel 90 miles or more from contractor's home base and employee's home, should be paid at \$80.00 per day subsistence pay plus base and fringe, regardless of county.
- (2) Los Alamos county: \$2.00 per hour incentive pay plus base and fringe.
- (3) Workers living 60 or more miles from a San Juan county job site receive \$3.00 per hour subsistence pay plus base and fringe.

Soft floor layer

- (1) Zone 1: Base pay for an area within a 30 mile radius from the main post office in the city or town where the employee permanently resides. Albuquerque, Santa Fe, and Belen shall be considered Zone I.
- (2) Zone 2: Work travel between 30 and 75 miles from the main post office in the town where an employee permanently resides shall be compensated at \$1.00 per hour above base pay.
- (3) Zone 3: Work travel 75 miles or more from the main post office in the town where an employee permanently resides shall be compensated at \$3.13 per hour above base pay.
- (4) Employer will furnish transportation or gasoline for all work performed beyond the 30 mile radius that encompasses the free cities of Albuquerque, Santa Fe or Belen.
- (5) When the employee is directed to report to a job site and the distance to the job site requires the employee to stay out of town overnight, the employer shall provide housing arrangements for the affected employees.

Sprinkler fitters

- (1) Work travel between 60 and 80 miles from the employee's primary residence should be compensated at \$22.00 per day.
- (2) Work travel between 81 and 100 miles from the employee's primary residence should be compensated at \$32.00 per day.
- (3) Work travel of 101 miles or more from the employee's primary residence should be compensated at \$120.00 per day.
- (4) No zone or subsistence pay shall be paid when the employer provides daily transportation and the employee elects to travel back and forth from home.



TYPE “H” – HEAVY ENGINEERING

Effective January 1, 2023

Trade Classification	Base Rate	Fringe Rate	Apprenticeship
Asbestos workers/Heat & Frost Insulators	35.56	12.26	0.60
Asbestos workers/Heat & Frost Insulators: Los Alamos County	37.99	12.26	0.60
Boilermaker/blacksmith	35.88	32.28	0.60
Boilermaker/blacksmith: San Juan County	36.83	31.88	0.60
Bricklayer/Block layer/Stonemason	25.54	8.81	0.60
Carpenter/Lather	27.73	12.14	0.60
Carpenter: Los Alamos County	33.18	13.58	0.60
Millwright/pile driver	37.10	28.30	0.60
Cement Mason	22.30	7.41	0.60
Electricians-Outside Classifications: Zone 1			
Ground man	25.43	11.76	0.60
Equipment Operator	36.48	16.09	0.60
Lineman or technician	46.09	18.52	0.60
Cable Splicer	47.22	18.81	0.60
Electricians-Outside Classifications: Zone 2			
Ground man	25.43	11.76	0.60
Equipment Operator	36.48	16.09	0.60
Lineman or technician	46.09	18.52	0.60
Cable Splicer	47.22	18.81	0.60
Electricians-Outside Classifications: Los Alamos			
Ground man	26.15	11.78	0.60
Equipment Operator	37.54	16.13	0.60
Lineman or technician	47.29	18.82	0.60
Cable Splicer	51.93	19.98	0.60

Electricians-Inside Classifications: Zone 1			
Wireman/low voltage technician	36.75	12.40	0.60
Cable Splicer	40.43	12.51	0.60
Electricians-Inside Classifications: Zone 2			
Wireman/low voltage technician	40.06	12.50	0.60
Cable Splicer	43.74	12.61	0.60
Electricians-Inside Classifications: Zone 3			
Wireman/low voltage technician	42.26	12.57	0.60
Cable Splicer	45.94	12.68	0.60
Electricians-Inside Classifications: Zone 4			
Wireman/low voltage technician	46.31	12.69	0.60
Cable Splicer	49.99	12.80	0.60
Electricians – Inside Classifications: Dona Ana, Hidalgo, Luna and Otero Counties			
Wireman/low voltage technician	32.07	9.81	0.60
Cable Splicer	32.07	9.81	0.60
Electricians-Inside Classifications: Los Alamos			
Wireman/low voltage technician	42.26	14.68	0.60
Cable Splicer	45.94	14.98	0.60
Glazier			
Glazier/Fabricator	21.25	6.70	0.60
Delivery Driver	12.00	6.70	0.60
Ironworker	28.05	18.30	0.60
Painter- Industrial	22.25	10.77	0.60
Paperhanger	19.75	10.77	0.60
Drywall Finisher/Taper - Industrial			
Ames tool Operator	27.67	8.40	0.60
Hand finisher/machine texture	26.67	8.40	0.60
Plumber/Pipefitter	38.63	14.55	0.60
Roofer	26.94	9.36	0.60
Sheet metal Worker	35.44	19.00	0.60
Operators			
Group I	23.34	6.74	0.60
Group II	23.55	6.74	0.60

Group III	23.78	6.74	0.60
Group IV	23.93	6.74	0.60
Group V	24.04	6.74	0.60
Group VI	24.26	6.74	0.60
Group VII	24.28	6.74	0.60
Group VIII	26.44	6.74	0.60
Group IX	32.87	6.74	0.60
Group X	36.54	6.74	0.60
Laborers			
Group I-Unskilled	18.34	7.11	0.60
Group II-Semi-Skilled	19.09	7.11	0.60
Group III-Skilled	20.60	7.11	0.60
Group IV-Specialty	21.00	7.11	0.60
Laborers-Underground			
Group I	20.25	6.93	0.60
Group II	20.62	6.93	0.60
Group III	20.97	6.93	0.60
Soft Floor Layer	21.00	9.20	0.60
Truck Drivers			
Group I	19.00	9.10	0.60
Group II	19.00	9.10	0.60
Group III	19.00	9.10	0.60
Group IV	19.00	9.10	0.60
Group V	19.00	9.10	0.60
Group VI	19.00	9.10	0.60
Group VII	19.00	9.10	0.60
Group VIII	19.00	9.10	0.60
Group IX	25.00	9.10	0.60
Maintenance Sub Group IX			
Rate I	20.90	9.00	0.60
Rate II	21.77	9.00	0.60
Rate III	22.24	9.00	0.60

NOTE: All contractors are required to pay SUBSISTENCE, ZONE AND INCENTIVE PAY according to the particular trade. Details are located in a PDF attachment at WWW.DWS.STATE.NM.US. Search Labor Relations/Labor Information/Public Works/Prevailing Wage Rates.

For more information about the Subsistence, Zone, and Incentive Pay rates, or to file a wage claim, contact the Labor Relations Division at (505) 841-4400 or visit us online at www.dws.state.nm.us.

SUPPLEMENTAL TECHNICAL SPECIFICATIONS

The following revisions and/or additions to the Technical Specifications of the Standard Specifications are hereby made a part of the Contract Documents.

<u>Spec Section</u>	<u>Title/Description</u>	<u>STS Page</u>
00621	Mobilization/Demobilization	00621-1 – 00621-4
00630	NPDES Compliance	00630-1 – 00630-3
00634	Native Grass Seeding w/ Hydro mulch	00634-1 – 00634-4
01010	Summary of Work	01010-1 – 01010-13
01300	Contractor Submittals	01300-1 – 01300-9
01600	Product Requirements	01600-1 – 01600-12
01700	Contract Closeout	01700 -1 – 01700-6
01730	Operation and Maintenance Data	01730-1 – 01730-10
02641	Valves	02641-1 – 02641-8
02776	High Density Polyethylene (HDPE) Liner	02776-1 – 02776-9
03100	Concrete Formwork	03100-1 - 03100-9
03150	Mechanical Pipe Seals & Sleeves	03150-1 – 03150-3
03151	Anchor Bolt & Chemical Anchors	03151-1 – 03151-4
03200	Concrete Reinforcement	03200-1 - 03200-5
03300	Cast-in-Place Concrete	03300-1 – 03300-23
03350	Concrete Finishing	03350-1 – 03350-8
03600	Grouting	03600-1 – 03600-3
05120	Structural Steel	05120-1 – 05120-5
05500	Metal Fabrications	05500-1 – 05500-15
09901	Painting and Coatings	09901-1 – 09901-12
09961	Fusion-Bonded Epoxy Linings & Coatings	09961-1 – 09961-5
15050	General Piping Requirements	15050-1 - 15050-5
15103	Fabricated Headwall Slide Gates	15103-1 – 15103-5
15108	Air Release & Vacuum Relief Valves	15108-1 – 15108-
15240	Ductile-Iron Pipe	15240-1 – 15240-7
16010	General Electrical Requirements	16010-1 – 16010-16
16075	Electrical Identification	16075-1 – 16075-10
16111	Conduit	16111-1 – 16111-17
16123	Low-Voltage Wire and Cable	16123-1 – 16123-8
16130	Boxes	16130-1 – 16130-5
16160	Cabinets and Enclosures	16160-1 – 16160-8
16190	Supporting Devices	16190-1 – 16190-3
16452	Grounding	16452-1 – 16452-3
16992	Control Panels and Panel Mounted Equipment	16992-1 – 16992-9
16993	Process Field Instrumentation and Controls	16993-1 – 16993-8
16994	Process Control Description	16994-1 – 16994-7

SECTION 621
MOBILIZATION/DEMobilIZATION

PART 1 DESCRIPTION

This work shall consist of preparatory and final work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and, for all other work and operations which must be performed or costs incurred prior to beginning work on the project, and subsequent to the completion of such work.

1.01 MOBILIZATION/DEMobilIZATION ADMINISTRATION REQUIREMENTS

- A. Definitions. The following definitions shall apply:
1. Total original contract amount shall mean the total amount bid as compensation for the contract.
 2. Total original contract amount less mobilization and demobilization shall mean the total amount bid as compensation for the contract less the amounts bid for mobilization and demobilization.

1.02 GENERAL

- A. It is the intent of this specification to provide for the contractor to:
1. Receive 100% of the amount bid for mobilization by the time the Contractor has performed ten percent (10%) of the total original contract amount bid less the amount bid for mobilization and demobilization.
 2. Receive 100% of the amount bid for demobilization by the time the Contractor has performed one-hundred percent (100%) of the total original contract amount bid less the amount bid for mobilization and demobilization.

1.03 PAYMENT PROCEDURES FOR MOBILIZATION

- A. The following will apply in effecting mobilization payments:
1. When the Contractor is eligible for payment of less than five percent (5%) of the total original contract amount bid less mobilization and demobilization, the Contractor will be paid twenty five percent (25%) of the amount bid for mobilization.
 2. When the Contractor is eligible for payment of from five percent (5%) to less than ten percent (10%) of the total original amount bid less mobilization and demobilization, the Contractor will be paid fifty percent (50%) of the amount

bid for mobilization minus any mobilization amount already paid.

3. When the Contractor is eligible for payment of ten percent (10%) or more of the total original contract amount less mobilization and demobilization, the Contractor will be paid 100% of the amount bid for mobilization minus any mobilization amount already paid.

1.04 PAYMENT CALCULATIONS

P_M	=	Mobilization Payment
M	=	Total amount bid for Mobilization
f_M	=	Mobilization payment percentage factor
	=	0.25, or 0.50, or 1.0, as applicable
P_M	=	M x f_M

EXAMPLE 1

MOBILIZATION

Total Original Contract Amount Bid	\$110,000
Amount Bid for Mobilization.....	\$ 5,000
Amount Bid for Demobilization	\$ 3,000
Total Original Contract Amount Less Mobilization and Demobilization	\$102,000

Percent of Work Completed	f _M	M	P _M
<5% of \$102,000	0.25	x 5,000	=\$1,250
>5% to <10% of \$102,000	0.50	x 5,000	=\$2,500*
≥10% of \$102,000	1.00	x 5,000	=\$5,000*

*minus previously paid amounts

1.05 PAYMENT PROCEDURES FOR DEMOBILIZATION.

A. The following will apply in effecting demobilization payments:

1. When the **Contractor** is eligible for payment of more than ninety percent (90%) of the total original contract amount bid less mobilization and demobilization, the **Contractor** will be paid twenty five percent (25%) of the amount bid for demobilization.
2. When the Contractor is eligible for payment of from ninety-five percent (95%) to less than one hundred percent (100%) of the total original amount bid less mobilization and demobilization, the Contractor will be paid fifty percent (50%) of the amount bid for demobilization minus any demobilization amount already paid.
3. When the Contractor is eligible for payment of one-hundred percent (100%) of the total original contract amount less mobilization and demobilization, the Contractor will be paid 100% of the amount bid for demobilization minus any demobilization amount already paid.

1.06 PAYMENT CALCULATIONS

- P_{DM}** = Demobilization Payment
DM = Total amount bid for Demobilization
f_{DM} = Demobilization payment percentage factor
= 0.25, or 0.50, or 1.0, as applicable
P_{DM} = **DM x f_{DM}**

EXAMPLE 2
DEMOBILIZATION

Total Original Contract Amount Bid	\$110,000
Amount Bid for Mobilization.....	\$ 5,000
Amount Bid for Demobilization	\$ 3,000
Total Original Contract Amount Less Mobilization and Demobilization	\$102,000

Percent of Work Completed	f _{DM}	DM	P _{DM}
>90% of \$102,000	0.25	x 3,000	=\$ 750

>95% to <100% of \$102,000	0.50	x	3,000	=	\$1,500*
≥100% of \$102,000	1.00	x	3,000	=	\$3,000*

*minus previously paid amounts

1.07 METHOD OF MEASUREMENT

- A. Mobilization and Demobilization will be measured by lump sum units.

1.08 BASIS OF PAYMENT

- A. Mobilization will be paid for at the contract price per Mobilization Bid Item.
Demobilization will be paid for at the contract price per Demobilization Bid Item.
No additional payments will be made for demobilization and remobilization due to shutdowns or suspensions of the work or for other mobilization and demobilization activities required to complete the contract satisfactorily.

SECTION 630
NPDES COMPLIANCE

PART 1 – GENERAL

1.01 DESCRIPTION

The work under this section specifies compliance with the U.S. Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges from construction sites. This work consists of developing a site specific Storm Water Pollution Prevention Plan (SWP3), and **implementing and maintaining** this plan to control erosion, pollution, sediment and runoff during the construction of the project.

1.02 SUBMITTALS

1. SWP3 Plan
2. Notice of intent
3. Notice of termination

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 GENERAL

- A. The U.S. Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES) regulations dictates the Storm Water Discharge for construction sites. The CONTRACTOR shall prepare and implement a site specific Storm Water Pollution Prevention Plan (SWP3) for all construction and dewatering (if required) activities. The plan will be implemented and maintained to control erosion, pollution, sediment and runoff during construction of the project.
- B. The CONTRACTOR shall prepare and implement the SWP3 in accordance with “NPDES General Permit for Storm Water from Construction Activities February 16, 2012.”
- C. The CONTRACTOR shall prepare and submit a Notice of Intent (NOI) for storm water discharges in accordance with “NPDES General Permit for Storm Water from Construction Activities February 16, 2012” using the EPA’s electronic NOI system which can be found on the EPA Web Site (www.epa.gov/npdes/stormwater/cgpenoi).
- D. As one specific component of the SWP3 the CONTRACTOR shall develop a spill prevention and response procedures that will be used during construction. The

CONTRACTOR shall provide both the ENGINEER and OWNER a copy of the spill prevention and response procedures for the proposed action prior to beginning construction.

- E. The spill prevention and response procedures identified in the plan may include, but are not limited to the following:
 - 1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location outside of any floodplain of a waterway, under cover, when not in use. Secondary containment shall be provided in order to contain the waste to a limited area, in case of a spill. The minimum practical quantity of all such materials will be kept on the job site.
 - 2. A spill control and containment kit (containing, for example, absorbent such as kitty litter or sawdust, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
 - 3. All of the product in a container will be used before the container is disposed of. All such containers will be properly disposed of in a manner in compliance with state and federal regulations and will not be allowed to mix with storm water discharges.
 - 4. All products will be stored in and used from the original container with the original product label.
 - 5. All products will be used in strict compliance with instructions on the product label.
 - 6. The disposal of excess or used products will be in strict compliance with instructions on the product label.
 - 7. All refueling of equipment shall take place at least 100 feet from any surface water.
- F. The CONTRACTOR shall provide spill prevention and response procedures training to all personnel prior to their working on the site.
- G. The CONTRACTOR shall immediately notify the ENGINEER, and the OWNER of any spills or contamination associated with construction of Drinking Water Project facilities within one hour of the occurrence.
- H. After final acceptance of the construction of the project, the CONTRACTOR shall prepare and submit a Notice of Termination of coverage for storm water discharges in accordance with “NPDES General Permit for Storm Water from Construction Activities February 16, 2012” using the EPA’s electronic NOI system which can be found on the EPA Web Site (www.epa.gov/npdes/stormwater/cgpenoi).

PART 4 – PAYMENT

4.01 For Unit Price Bid Proposals, NPDES compliance shall be paid for as follows:

- A. Twenty-five (25) percent of the Lump Sum unit price amount shall be paid after the CONTRACTOR has prepared a SWP3, provided a copy of the SWP3 to the OWNER and to the ENGINEER for review and concurrence, and completed an **EPA Notice of Intent for Storm Water Discharges Associated with Construction Activity Under a NPDES General Permit**, or a Low Erosivity Waiver (LEW) form, if applicable. A copy of the NOI, or a hard copy of the LEW form, must be delivered to the OWNER and to the ENGINEER and the original filed with the EPA. All required erosion control measures sufficient to begin construction must also be in place. This will be defined in the plan specifications and/or the SWP3.
- B. Payment for an additional fifty (50) percent of the Lump Sum unit price amount shall be prorated based on the **Actual Percent Complete** on the *Application for Payment* as approved by the ENGINEER. For example, if the CONTRACTOR is 20% complete, the CONTRACTOR can take the 20% (0.2) and multiply it by half of the Lump Sum unit price amount, and receive that portion.

In order to receive payments, the field inspection forms must be sent in with the *Application for Payment* each month. If there are deficiencies maintaining or implementing the SWP3 and its Best Management Practices (BMPs), the payment will be withheld until the deficiencies are corrected.

- C. The remaining twenty-five (25) percent of the Lump Sum unit price amount will be based on the completion of an EPA Notice of Termination (NOT) of Coverage under a NPDES General Permit for Storm Water Discharges Associated with Construction Activity and BMP removal. A copy of the NOT must be delivered to the OWNER and to the ENGINEER and the original filed with the EPA. BMPs must be removed as defined in the plan specifications or SWP3. This is done in case there are some BMPs that must remain until final stabilization is met, and that there are no more NPDES concerns for the CONTRACTOR.

END OF SECTION

SECTION 634
NATIVE GRASS SEEDING, W/ HYDROMULCH

PART 1 – GENERAL

1.01 DESCRIPTION

Work under this section consists of preparing all area indicated on the plans for native grass seeding, furnishing and installing all seed, fertilizer and soil amendments as specified herein and on the plans, or as authorized by the Project Engineer.

1.02 REFERENCES

- A. COA Specification Section 701: TRENCHING, EXCAVATION AND BACKFILL 634.2 REFERENCES COA Section 1011 Turf Grass Seeding

1.03 WORK AREA/TIMING

- A. Areas that are disturbed by the Contractor that are outside the construction limits shown on the plans or authorized by the Project Engineer shall be seeded with native grasses as specified herein at no cost to the Owner.
- B. The seeding of disturbed areas shall commence upon completion of the other work in the area. No seeding will begin until a pre-seeding walk through of the project with the Project Manager is done to ensure proper grading of the site.

PART 2 - MATERIALS

2.01 NATIVE SEED

- A. The native seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specification.

- 1. Sandy Soils: (mainly west side areas). Seed rate is given in pounds of pure live seed (P.L.S.) per acre.

Variety / Common Name	Genus / Species	P.L.S. / Acre
“Paloma” Indian rice grass	Oryzopsis	5.0
“Viva” Galleta grass	Hilaria jamesii	1.0
“Niner” Sideoats grama	Bouteloua curtipendula	3.0
“Hatchita” Blue grama	Bouteloua gracilis	1.0
Sand dropseed (NM Region)	Sporobolus cryptandrus	1.0
Fourwing saltbush (NM Region)	Atriplex canescens (de-winged)	1.0
Total rate =		12.0 lbs/acre

- 2. Seeds may be pre-mixed by a seed dealer. Each bag of seed shall be sealed and labeled by the seed dealer in accordance with Federal Seed Laws and New Mexico

Department of Agriculture Labeling Laws. This includes: variety, kind of seed, lot number, purity, germination, percent crop, percent inert, percent weed (including noxious weeds), origin, test data and net weight. Federal Seed Laws require that analysis shall be no older than 5 months for seed shipped interstate and no older than 9 months for seed shipped intra-state. The Project Engineer shall receive all labels from all bags of seed used for verification.

3. Fertilizer and Soil Amendments: Unless otherwise specified on the plans or in the Supplemental Technical Specification, no fertilizer or other soil amendments are required on areas specified to receive native seeding.

2.02 MULCH:

1. Hydromulch: The type of hydromulch to be used shall be wood fiber derived from Hemlock, Aspen or Alder chips dyed green in 50 pound bales, or approved equal. The type of tackifier to be used shall be the Ecology Controls M-Binder, or approved equal.
2. Erosion Control Mats, Fabric or Blankets: The type of erosion control mats, fabric or blankets used shall be as specified or allowed on the plans or in the Supplemental Technical Specifications.

PART 3 - EXECUTION

3.01 SEED AND PREPARATION, GENERAL

- A. Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the Project Manager.
- B. No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the discing operation.
- C. The extent of seed bed preparation shall not exceed the area on which seeding, mulching and crimping operations can be completed prior to crusting or wind or water erosion of the prepared surface – if erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the Project Engineer prior to the seeding and mulching operations.
- D. Mechanical Preparation: The seed bed shall be loosened to a minimum depth of 6” (six inches) by means of disc or harrow. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if discing alone does not result in preparation to the full minimum depth of 6”. The soil shall be worked to a smooth surface free of clods, stones 4” and larger or any other debris or foreign material that could interfere with seeding or crimping equipment operations.
- E. Hand Preparation: Areas which cannot be prepared with mechanized equipment because of small size irregular shape or slope angle may be prepared to a minimum depth of 2” using hand tools or a rototiller. Any such areas will be specified on the plans.

3.02 SEEDING GENERAL

- A. Seeding shall not start until the seed bed preparation has been inspected and approved by the Project Manager.
- B. No seeding operations may be conducted when steady wind speed exceeds 10 miles per hour. If winds exceed 10 mph while seeding is underway, seeding operations will be halted and any areas seeded to that point completed.

3.03 SEED APPLICATION:

- A. Broadcast Seeding: Seed will be applied using the broadcast method. Seed will be broadcast by means of a hydromulch slurry blower provided that the seed is evenly distributed over the seeding area.
- B. Hydro Seeding: Hydro seeding will be allowed on areas of non-irrigated native grass seeding as specified on the plans or authorized by the Project Manager.

3.04 - MULCHING

All seeded areas shall be hydromulched unless otherwise specified on the plans or in the Supplemental Technical Specifications. Use materials identified in Section Hydromulch shall be applied at a rate of 1,000 to 2,000 pounds per acre. The tackifier shall be incidental to the seeding.

3.06 PROTECTION OF NATIVE GRASS SEEDED AREA

The Contractor shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at this expense any damage to seeded areas caused by pedestrian or vehicular traffic or vandalism.

3.07 – INSPECTION FOR NATIVE GRASS AREA

- A. The following inspection shall be the minimum required inspections to native grass during the course of construction. Additional inspections shall be made at any time at the discretion of the Project Manager.
- B. It shall be the responsibility of the Contractor to notify the Project Engineer, in writing, 48 hours in advance of each required inspection.
- C. The sequence of required inspections shall not be changed from the sequence listed below. The Contractor shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payment will not be approved for items which have not been inspected and approved in writing.
- D. Each phase of soil preparation shall be inspected in process.
- E. Finish grade shall be inspected.
- F. Seed shall be inspected prior to seeding.
- G. Seeded area shall be inspected after completion.

H. Final inspection of the project and acceptance.

PART 4 – MEASUREMENT AND PAYMENT

The measurement of native grass seeding shall be by the acre. The payment shall be made at the contract unit price per acre of native grass seeding complete in place, which shall include the seed, fertilizer (if required) area preparation, seeding, soil amendments, (if required) and hydromulching.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 GENERAL

The Work to be performed under this Contract shall consist of furnishing all plant, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services, including: fuel, power, water, and essential communications, and performing all Work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. Note: By submitting a bid for this project, the CONTRACTOR hereby acknowledges and assures the OWNER that it has sufficient experience in constructing this type of work and therefore is familiar with all combinations of materials, labor, and equipment that are required for the successful completion of this project. The Work shall be complete, and all Work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete, safe and proper construction of the Work in good faith shall be provided by the CONTRACTOR at no increase in cost to the OWNER.

1.02 CONTRACTOR'S REPRESENTATIVES

- A. At the Pre-construction Conference, the CONTRACTOR shall provide the OWNER an Organizational Chart of the CONTRACTOR'S PROJECT TEAM for the project, including responsibilities of all related personnel. At a minimum, this organizational chart should include the Project Manager, Project Superintendent, Safety Representative, Scheduler and OWNER or Partner of the CONTRACTOR under Contract. Phone numbers or instructions on how to contact key personnel must be provided. Resumes of all project related personnel should be included for review and approval by the OWNER. All key personnel as identified in the organizational chart are required to have assumed the same level of responsibility on three (3) projects of similar scope and magnitude.
- B. An Authorized Representative must be designated, with a clear definition of the scope of this individual's authority to represent or act on behalf of the CONTRACTOR. Any limitations in the authority of this designated representative must also be clearly delineated. At all times when work is underway at the jobsite, the CONTRACTOR'S Project Manager or Superintendent shall be present at the jobsite to supervise the work. The CONTRACTOR shall also supply an alternative Authorized Representative to act on his behalf in an emergency situation or if the prime Authorized Representative is unavailable for any reason. The limits and extent of this individual's authority to act on the CONTRACTOR'S behalf must also be clearly defined. All instructions, determinations, notices and other communications given to the Authorized Representative of the CONTRACTOR shall be binding upon the CONTRACTOR. An Authorized Representative must be

available by cell phone and/or radio on a twenty-four (24) hours a day, seven (7) days a week basis throughout the course of the Contract. In the event that no Authorized Representative is available in an emergency situation requiring the CONTRACTOR'S action or should the CONTRACTOR fail to respond within two (2) hours, the OWNER may take the appropriate actions to remedy the situation at the CONTRACTOR'S expense. The CONTRACTOR, by failing to respond to the call, shall waive any rights to claims caused by the OWNER'S actions.

- C. All key personnel as described in the CONTRACTOR'S organizational chart must be approved by the OWNER prior to the commencement of work on the project. Resumes of key personnel should include related experience on three previous projects of similar magnitude and complexity. In the event that a member of the project team proves to be unsatisfactory to the CONTRACTOR and ceases to be in his employ, all substitutions must be reviewed and approved by the OWNER. Key personnel shall not be replaced without prior approval by the OWNER.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Base Bid Contract comprises construction of the following:
 - 1. Remove and dispose of specified existing utilities and all associated materials within the construction limits of the reservoir improvements.
 - 2. Grade Reservoir 1 according to proposed grading plan on sheet C-03.
 - 3. Removal of 2 ft depth of compacted clay from reservoir bottom and replace with compacted sand.
 - 4. Remove and replace existing outlet piping with new 20" DI pipe.
 - 5. Install HDPE Liner within Reservoir 1 limits including pipe penetrations, and other appurtenances including excavation and disposal of material.
 - 6. Construct new outlet tower structure foundation, steel framing, and all other associated works.
 - 7. Construct concrete access ramp drive pad along access ramp alignment.
 - 8. Remove extraneous safety bollards from construction limits around reservoir perimeter.
 - 9. Associated Electrical and Instrumentation for the level sensors in the outlet tower and flow meter on inlet channel.
- B. The work in the Additive Alternate comprises of the following:

1. Remove and replace existing combination air release valves (2" & 3") along the 12" transmission line from the Navajo Pump Station to Reservoir 3 (Tiger Lake).
- C. The Work is located in Aztec, in the County of San Juan, New Mexico, as indicated on the Drawings.

1.04 WORK BY OTHERS

The CONTRACTOR'S attention is directed to the fact that work may be conducted at or adjacent to the Site by other contractors during the performance of the Work under this Contract. The CONTRACTOR is to conduct its operations in a manner that will minimize any interference with the Work of other contractors under separate contract with the OWNER or other entities, and shall coordinate its operations and cooperate fully, with such contractors to provide continued safe access to their respective portions of the Site, as required to perform Work under their respective contracts. The CONTRACTOR shall include in the bid price all costs associated with the successful coordination of its operations with other contractors. Copies of Contract Documents pertaining to Work conducted on or adjacent to the site are available for review upon request.

1.05 COORDINATION

A. Existing Utilities and Structures

Known utilities and structures adjacent to or expected to be encountered in the work are shown on the drawings. The locations shown are taken from existing records or information obtained from the Utility Owner. All existing utility data represented on the profile is approximate field measurements from surveying of manholes. Profile elevations for gravity lines such as storm drain and sanitary sewer were calculated. Data points identified as "DEPTH UNK" were based on assumed typical depth of bury and not verified by potholing activities. Prior to construction activities, the CONTRACTOR shall verify the horizontal and vertical locations of all existing utilities and obstructions within or adjacent to the work zone which would impact the proposed alignment. Utilities shown are for the convenience of the CONTRACTOR only, and no responsibility is assumed by either the OWNER or the ENGINEER for their accuracy or completeness. If a conflict with any existing utility is identified during construction, the CONTRACTOR shall submit the existing utility information (referenced by station, offset and TP or invert elevation) to the OWNER AND ENGINEER for review. The CONTRACTOR shall provide a minimum of five (5) working days from when all requested information is provided by the CONTRACTOR for the OWNER to provide a resolution of the conflict.

1. CONTRACTOR shall protect all existing utilities within the boundaries of the work. Utilities damaged, as a result of the CONTRACTOR'S operations

due to his negligence or oversight shall be repaired to the satisfaction of the OWNER of said utility at CONTRACTOR'S sole expense.

2. At least 48 hours prior to start of said work, CONTRACTOR shall notify all utilities that may be affected.
 3. For location of utilities, CONTRACTOR shall call New Mexico One Call, phone number (800)321-2537 for coordinating and identifying utility locations.
 4. CONTRACTOR shall protect all existing structures within the boundaries of the work and adjacent to the work. CONTRACTOR shall be responsible for visiting the site and becoming familiar with all existing structures. Existing structures damaged that were not part of this contract shall be repaired to their original condition at CONTRACTOR'S sole expense.
 5. For convenience, the CONTRACTOR may remove and replace small structures such as mailboxes, signs, gates, walls, fences and valve boxes that indirectly interfere with the construction outlined in this contract. CONTRACTOR shall notify the OWNER of each structure to be removed seven (7) calendar days prior to removal and provide temporary mailboxes, signs, fences, or other miscellaneous structures until the permanent structures are replaced. If a traffic control sign is removed, CONTRACTOR shall make arrangements to erect a temporary sign acceptable to the OWNER. All small surface structures removed shall be replaced in the same location in as good, or better, than the original condition. The cost for this work shall be considered incidental to the pipeline construction and shall be included in the pipeline unit costs as shown in the bid proposal.
- B. Cultural and Archaeological Resources: In the event that cultural material or human remains are encountered during excavation, CONTRACTOR shall immediately stop all work in the vicinity of the discovery, notify ENGINEER of the discovery and protect the area from further disturbance. No work shall proceed in the vicinity of the discovery without written approval of ENGINEER.
- C. Physical Resources: Implement temporary and permanent soil erosion and storm-water pollution control measures in accordance with the NPDES storm-water permit process and develop a SWPPP using BMPs.

1.06 WORK SEQUENCE AND SCHEDULING CONSTRAINTS

- A. The CONTRACTOR shall schedule and perform the Work in such a manner as to result in the least possible disruption to the public's use of roadways, driveways, and utilities. Utilities shall include but not be limited to water, sewerage, drainage structures, ditches and canals, gas, electric, cable television, and telephone. Refer to all available plan and profile sheets for approximate location of utilities. It is the CONTRACTOR'S responsibility to locate each utility and incorporate as-built locations on the reproducible record plans, in red ink, showing proper location on each

sheet where these utilities are located including depths, widths, and lengths of each utility. There is no guarantee as to exact location of each utility and no additional compensation will be made for utilities that are within a reasonable proximity of the area shown on the record plans.

- B. WORK ELEMENT 1: Perform demolition, removal, and disposal of all dysfunctional concrete, unsuitable materials, and other requested items to be removed within Reservoir 1 construction limits.
- C. WORK ELEMENT 2: Remove all existing suction piping from the alignment shown on the construction drawings and replace with new 20” ductile iron pipe.
- D. WORK ELEMENT 3: Perform all required earthwork (cut/fill) and re-grading of Reservoir 1 side slopes as shown on sheet C-02.
- E. WORK ELEMENT 4: Construct new reinforced concrete access ramp along the western side slope of newly graded reservoir.
- F. WORK ELEMENT 5: Construct new outlet tower structure, walkway, and all associated outlet tower headworks including sluice gates, pipe penetrations, etc.
- G. WORK ELEMENT 6: Perform all electrical site improvements, including installation of new conduit, and underground pull box. Perform all associated grounding and termination of new electrical conduit. Perform all existing electrical panel improvements work.
- H. WORK ELEMENT 7: Install HDPE Liner along reservoir bottom, furnish/provide concrete grand control indicators and lay 2-foot layer of sand on top of HDPE liner once it is properly anchored at the reservoir bottom. Continue installing HDPE liner along reservoir side slopes and installing proper pipe penetrations/collars where necessary.

1.07 CONTRACTOR ACCESS AND USE OF PROJECT SITE

The CONTRACTOR’S use of the Project Site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices.

1.08 CITY OF AZTEC USE OF THE PROJECT SITE

The City of Aztec may utilize all or part of the existing Site and existing facilities during the entire period of construction for the conduct of the CITY OF AZTEC’S normal operations and for other projects. The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the operations and projects and to minimize interference with the other contractor’s operations at the same time. In any event, the CITY OF AZTEC shall be allowed safe access to the Project Site during the period of construction.

1.09 TIME OF WORK AND OVERTIME NOTIFICATION

- A. For work on this project, no work shall be performed between 6:00 p.m. and 7:00 a.m., or on Sundays or legal holidays, without the written permission of the OWNER or ENGINEER or unless otherwise noted on the drawings. However, critical maintenance or emergency work may be completed without prior approval.
- B. If CONTRACTOR, for convenience, should desire to work outside of normal hours, written authorization must be obtained from the County and ENGINEER prior to start of the work.

1.10 STORAGE

Storage conditions shall be in accordance with the manufacturer's requirements and shall be acceptable to OWNER for all materials and equipment not yet incorporated into the Work but included in Applications for Payment. Such storage arrangements and conditions shall be presented in writing for OWNER review and acceptance and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to OWNER. The stored materials shall be insured for full value.

1.11 NOTICES TO OWNERS OF ADJACENT PROPERTIES AND UTILITIES

- A. CONTRACTOR shall notify OWNERS of adjacent property and utilities in advance of when prosecution of the Work may affect them.
- B. When it is necessary to temporarily interrupt any utility service connection, CONTRACTOR shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit any resulting inconvenience.
- C. Utilities and other concerned agencies shall be contacted at least seven days prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines. The CONTRACTOR must submit to the OWNER and each affected utility a written description of the area, time, duration, and proposed method of disruption and reparation. With the exception of emergencies and/or events that may compromise the public safety, no disruption will be allowed without the CONTRACTOR having first obtained the express written approval of the OWNER.

1.12 PROJECT MEETINGS

- A. Preconstruction Conference
 - 1. Prior to the commencement of Work at the Site, a preconstruction conference will be held at a mutually agreed time and place which shall be attended by

the CONTRACTOR'S Project Manager, its Superintendent, its Safety Representative, and its Subcontractors as the CONTRACTOR deems appropriate. Other attendees will be:

- a. OWNER'S CONSTRUCTION MANAGER;
 - b. Representatives of OWNER;
 - c. Governmental representatives as appropriate;
 - d. Others as requested by CONTRACTOR, OWNER, or OWNER'S CONSTRUCTION MANAGER;
 - e. ENGINEER; and
 - f. CONTRACTOR'S personnel assigned to Scheduling. In the event CONTRACTOR elects to utilize an outside agency to perform its scheduling requirements, the responsible personnel from such Agency is required to attend.
2. Bring to the conference the submittals indicated in Section 01300 - Contractor Submittals.
 3. The purpose of the conference is to designate responsible personnel, discuss contract requirements and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. Any additions to the agenda by CONTRACTOR must be forwarded to the OWNER at least 24 hours prior to the scheduled meeting date and time.
 4. The CONTRACTOR shall be prepared to discuss all of the items listed below.
 - a. CONTRACTOR'S assignments for safety and first aid, including Designated Competent person(s) and CONTRACTOR'S safety Representative.
 - b. CONTRACTOR'S schedules as required by Contract.
 - c. Transmittal, review, and distribution of all documents between the CONTRACTOR and the OWNER including CONTRACTOR'S submittals, RFI'S, Survey Requests, etc.
 - d. Processing applications for payment.
 - e. Maintaining record documents.
 - f. Critical Work sequencing.
 - g. Field decisions and Change Orders.
 - h. Use of project site, office and storage areas, security, housekeeping, and OWNER'S needs.
 - i. Major equipment deliveries and priorities.

- j. Permits required for construction.
 - k. Utilities required for construction.
 - l. Contract Authority and channels of communication.
 - m. Coordination with others.
 - n. Conflict resolution procedures.
5. The OWNER'S CONSTRUCTION MANAGER will preside at the pre-construction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

B. Progress Meetings

1. The OWNER'S CONSTRUCTION MANAGER will schedule and hold regular on-Site progress meetings at least weekly and at other times as requested by OWNER'S CONSTRUCTION MANAGER or as required by progress of the Work. The CONTRACTOR, OWNER'S CONSTRUCTION MANAGER and all Subcontractors active on the Site must attend each meeting. CONTRACTOR may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.
2. The OWNER'S CONSTRUCTION MANAGER will preside at the meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings will be to review the progress of the Work, discuss safety, maintain coordination of efforts, discuss commercial issues, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR is required to present any issues which may impact his Work, with a view to resolve these issues expeditiously.

C. Subcontractor Coordination Meetings

1. The CONTRACTOR is expected to conduct regularly scheduled coordination meetings with Subcontractors, Suppliers, and Manufacturers to manage and ensure the smooth progression of the work. Request representation at each meeting by all applicable parties involved in the coordination of current activities or concerned with the planning of upcoming work. During each meeting the following topics need to be addressed:
 - a. The development of a four week look-ahead schedule (to be distributed to the OWNER at the subsequent progress meeting).
 - b. Any concerns relating to the progress of the work.
 - c. Any other items as deemed necessary by any of the related parties.

D. Pre-Activity/Specialty Coordination Meetings

1. Pre-Activity meetings are to be held no later than twenty-four (24) hours prior to the execution of any activity requiring inspection or as deemed necessary by the OWNER. Required attendees should include at a minimum the OWNER'S CONSTRUCTION MANAGEMENT TEAM, the CONTRACTOR'S Project Manager, Superintendent and any other related personnel.

1.13 CONTRACTOR'S REQUEST FOR INFORMATION (RFI)

A. In the event that the CONTRACTOR determines that some portion of the Contract Documents requires additional information or interpretation, the CONTRACTOR shall submit a written statement to the OWNER'S CONSTRUCTION MANAGER requesting clarification on the issue. Such request must be provided by the CONTRACTOR to the OWNER immediately upon discovery. Prior to the submittal of the RFI the CONTRACTOR shall carefully study and review the Contract Documents to ensure that the requested information is not contained therein. Submit only one issue to be clarified per form. The CONTRACTOR must include in a properly written RFI the following information:

1. Contract number and title, RFI number (sequentially numbered), date, person requesting clarification and signature.
2. A clear and concise summary of the issue in question and why further clarification or information is required from the OWNER.
3. The specific drawing shall be identified by drawing number and location on the drawing sheet.
4. The specific specification section shall be identified by section number, page and paragraph.
5. Where applicable, the CONTRACTOR shall include his own interpretation of the drawings or specifications and why he believes such an understanding is correct.
6. In cases requesting clarification of coordination issues, the CONTRACTOR shall include a suggested solution with necessary drawings or sketches with the RFI.

B. Only RFI'S submitted by the CONTRACTOR will be accepted. Any clarifications required by the Subcontractors, Manufacturers, or Suppliers of the CONTRACTOR must be properly routed through the CONTRACTOR to the OWNER on the appropriate form. All RFI'S must be limited to clarifications of the Contract Documents. RFI'S shall not be used for the purpose of notifying the OWNER of the following:

1. To request approval of submittals.

2. To request approval of substitutions.
 3. To request changes which entail additional cost or credit.
 4. To request methods of performing work different than those shown or specified.
- C. If the OWNER determines that the RFI is not in relation to clarifications relating to the Contract Documents, such RFI will be returned to the CONTRACTOR with an explanation which may include references to other sections within the Contract for the CONTRACTOR to follow.
- D. Improper or frivolous RFI'S that are not properly prepared as detailed above, or request information that is clearly shown in the Contract Documents, will be returned to the CONTRACTOR labeled as either Improper or Frivolous with the reasons for such determination. Should additional costs be incurred by OWNER as a result of reviews of RFI'S that were deemed Improper or Frivolous, OWNER will withhold from CONTRACTOR'S final payment an amount based on ENGINEER'S current fee schedule, including applicable miscellaneous expenses, so that OWNER may reimburse ENGINEER for such reviews.
- E. After receipt of the RFI, the OWNER will be allowed fourteen (14) calendar days to review and respond to the issue. If additional time is required by the OWNER, the CONTRACTOR will be notified in writing. Responses by the OWNER shall not be interpreted as authorization to proceed with extra work. In the event that the CONTRACTOR believes that additional cost or time is involved from the clarification provided by the OWNER, the CONTRACTOR shall notify the OWNER in writing that a change order is required and the reasons for his belief that this work constitutes a change in his Contractual requirements. At no point in time is the CONTRACTOR to proceed with extra work without the written consent of the OWNER.

1.14 DAILY ACTIVITIES REPORT

- A. Commencing with the date of Notice to Proceed, which shall be considered as Contract Day No. 1, the CONTRACTOR shall prepare and forward to the OWNER'S CONSTRUCTION MANAGER a Daily Activity Report. A Daily Activity Report shall be executed by the CONTRACTOR for each Contract day, for each shift, whether work takes place or not. Report shall be submitted to the OWNER'S CONSTRUCTION MANAGER either at the end of each working day or the following morning prior to the start of operations. This report shall contain not less than the following data:
1. CONTRACTOR.
 2. Contract name and number.
 3. Contract day, date and shift.

4. All personnel engaged in the Contract, including management, supervisory, clerical, engineering, and manual.
5. An exact count of personnel hours by trade, craft, duties, CONTRACTOR or Subcontractor.
6. An exact account of all equipment that is on site or committed to the Contract, indicating hours worked and idle.
7. All personnel hours and equipment hours shall be identified by the activity number or node displayed in the approved construction schedule.
8. List all accidents.
9. List all Subcontractors active on site.
10. Name and Signature of CONTRACTOR'S Authorized Representative.
11. Work performed, including area (i.e. - station).
12. Conflicts encountered.

1.15 AS-BUILT DRAWINGS

The CONTRACTOR shall, during progress of the work keep a careful record of all changes and corrections to the Contract Drawings. This record shall show the actual field locations, all project conditions, configurations, and any other changes or deviations that vary from the details provided in the original Contract drawings. The horizontal and vertical locations of any buried or concealed construction and utility features that were either not shown on the drawings or vary from the locations indicated, shall be carefully recorded. Include detailed sketches to fully illustrate the constructed work. The as-built drawings shall be available for review by the OWNER at all times during the construction period. At the end of each month, prior to each monthly progress payment, these drawings will be inspected by the OWNER. If these drawings are not found to be complete and up-to-date, a non-compliance report will be issued and ten (10) percent will be withheld from the CONTRACTOR'S progress payment. If the OWNER receives a written notice of the correction of the condition that resulted in the withholding, signed by an authorized agent of the CONTRACTOR, the OWNER shall pay the amount withheld within 30 days after receiving the next progress estimate.

The as-built drawing format shall be red-line mark-ups on a set 24" x 36" drawing paper prints.

Upon completion of construction and prior to final payment, the CONTRACTOR shall submit to the OWNER one (1) copy of the red-lined mark-ups showing all changes, including the type, make, model, class, manufacturer, etc., as applicable, of all major items of material used in the project as well as the source of all said items. The as-

builds drawings shall be completed and certified by a New Mexico Professional Surveyor.

1.16 CITY NOISE ORDINANCE COMPLIANCE

CONTRACTOR shall comply with the requirements of the City of Aztec noise ordinance at all times. CONTRACTOR shall obtain all permits and/or variances required to permit work outside of normal working hours, including Extended Hours of Construction if required on this project.

1.17 PERMITS

The CONTRACTOR shall procure all permits and encroachments except for those already obtained by the OWNER.

PART 2 - PRODUCTS

2.01 PRODUCT REQUIREMENTS

As stated in the New Mexico Standard Specifications for Public Works Construction or the Supplemental Specifications. Supplemental Specifications shall take priority over the standard specifications.

PART 3 – EXECUTION

3.01 SEQUENCE OF WORK

The work associated with this project shall be accomplished in the sequence of work deemed necessary by the CONTRACTOR. The CONTRACTOR shall coordinate with the respective owner for the following project constraints:

3.02 CITY OF AZTEC

The COA owns and operates the water system facilities adjacent to the Reservoir site. The CONTRACTOR must allow the COA access to all facilities within these sites throughout the construction duration. All construction activities within the fence lines shall be performed continuously without interruption until complete within the approved working hours. LIQUIDATED DAMAGES

Construction is required to be accomplished within described durations and liquidated damages shall be assessed. Liquidated damages will be cumulative for each calendar day that work within each construction phase remains incomplete beyond either the allowable duration or the allowable dates as set forth below. The

scheduling constraints and liquidated damages to be assessed for failure to complete all work within the constraints are as follows:

CONST ACTIVITY	DURATION CONSTRAINTS	DATE CONSTRAINTS	LIQUIDATED DAMAGES (per day)
Entire Project	Max 210 calendar days duration from Notice to Proceed	N/A	\$1,500.00
Punch List	Max 30 calendar day duration following substantial completion	N/A	\$1,500.00

NOTE: All Liquidated Damages Shall Be Cumulative.

PART 4 – PAYMENT

4.01 GENERAL

Costs for the work in this Section shall not be paid for separately but shall be considered incidental to the contract work to be accomplished.

END OF SECTION

SECTION 01300
CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

- A. CONTRACTOR "Submittals" may be Shop Drawings, schedules, surveys, reports, samples, plans, lists, drawings, documents, findings, programs, manuals, data, or any other item or information required by the Contract Documents to be submitted or offered by the CONTRACTOR in accomplishing the Work.
- B. Wherever Submittals are required hereunder, all such documents shall be furnished to the OWNER'S CONSTRUCTION MANAGER.
- C. The CONTRACTOR shall be responsible for the accuracy, completeness, and coordination of all Submittals, including but not limited to, Submittals of or from an item, product, thing, service, person or firm which is specified in the Contract Documents; such specified Submittals shall not be presumed to be acceptable to the OWNER and shall be subject to the same approval process as all other Submittals. The CONTRACTOR shall not delegate this responsibility in whole or in part to any Subcontractor. Submittals may be prepared by the CONTRACTOR, Subcontractor, or Supplier, but the CONTRACTOR shall ascertain that each Submittal meets the requirements of the Contract and the Project. The CONTRACTOR shall ensure that there is no conflict with other Submittals and shall notify the OWNER'S CONSTRUCTION MANAGER in each case where its Submittal may affect the work of another Contractor or the OWNER. The CONTRACTOR shall ensure coordination of Submittals of related crafts and Subcontractors.
- D. Failure to make timely submittals in accordance with the requirements of the specifications shall constitute grounds for the OWNER to withhold 20 percent of compensation for the equipment to which the submittal is related, or, in the case of information lists, record drawings, investigation findings, safety plans, quality plans, and similar items, the OWNER may withhold 20 percent of the value of the information in the submittal.

1.02 PRE-CONSTRUCTION CONFERENCE SUBMITTALS

- A. At the preconstruction conference, submit the following items for review:
 - 1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitute ("Or-Equal") submittals.
 - 2. A list of all permits and licenses the CONTRACTOR shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

3. A preliminary schedule of values.
4. A preliminary project schedule.
5. The names and qualifications of Designated Safety Representative.

1.03 PROGRESS REPORTS

- A. Furnish a progress report to OWNER'S CONSTRUCTION MANAGER with each Application for Payment. If the Work falls behind schedule, submit additional progress reports at such intervals as OWNER'S CONSTRUCTION MANAGER may request.
- B. Each progress report shall include sufficient narrative to describe any current and anticipated delaying factors, effect on the construction schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to OWNER'S CONSTRUCTION MANAGER, must be substantiated with satisfactory evidence.
- C. Each progress report shall include a list of the activities completed with their actual start and completion dates, a list of the activities currently in progress, and the number of working days required to complete each.

1.04 SHOP DRAWINGS

- A. Wherever called for in the Contract Documents, or where required by the ENGINEER, furnish to the OWNER'S CONSTRUCTION MANAGER for review, nine copies of each Shop Drawing Submittal. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations as part of a Submittal, such calculations shall bear the signature and seal of a professional engineer registered in New Mexico unless otherwise directed.
- B. Submission Requirements
 1. BHITracker® shall be used during construction as a central location for all material submittals/shop drawings, Requests for Information (RFI), Cost Proposals (CP), Design Revisions (DR), daily field reports, field and materials test reports, weekly meeting minutes, change orders and pay applications, cost proposals, and other related documentation. RFI and material submittal logs can easily be printed for use at progress meetings.
 1. All project documents listed above shall be submitted through BHITracker.
 2. Contractor shall coordinate with BHI for access to BHITracker if not done during the bidding phase of the project. BHITracker can be access at the following URL: <https://bhitracker.bhinc.com/default.aspx>

C. Organization

1. Submittals shall accurately identify the correct specification section. Any submittal that does not identify the correct specification or include multiple submittals can be rejected and the Contractor be required to make the necessary corrections and resubmit.
 - a. Deviations from Contract Documents:
 - i. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted in the specification by a number in the margin to the right of the identified paragraph. This number shall be referenced to a detailed written explanation of the reasons for requesting the deviation.
 - ii. The Engineer shall be the final authority for determining acceptability of requested deviations.
 - iii. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.
 - iv. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

D. Format

1. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 24 inches by 36 inches. Every page in a Submittal shall be numbered in sequence.
2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
3. Each Submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The Submittal numbers shall be clearly noted on the transmittal. Original Submittals shall be assigned a numeric Submittal number. Resubmittals shall bear an alphanumeric system which consists of the number assigned to the original Submittal for that item followed by a letter of the alphabet to represent that it is a subsequent Submittal of the original. For example, if Submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.

- E. Disorganized Submittals which do not meet the requirements above will be returned without review.
- F. Resubmission Requirements
 - 1. Make any corrections or changes in the submittals required by the Engineer and resubmit to BHITracker for approval.
 - 2. Shop Drawings and Product Data:
 - a. Revise and resubmit drawings or data to BHITracker. as specified from the initial review.
 - b. Indicate any changes which have been made other than those requested by the Engineer.
 - 3. Samples: Submit new samples as required for initial submittal.
- G. Engineer's Duties
 - 1. Review and return submittals within 14 days of receipt of submittal.
 - 2. Affix stamp and initials or signature, and indicate requirements for resubmittal or review of submittal.
 - 3. Return submittals to Contractor for distribution or for resubmission.
 - 4. Engineer's review does not constitute acceptance or responsibility for accuracy or dimensions, nor shall it relieve the Contractor from meeting any requirements of the Contract Documents, nor shall it constitute approval for any deviation from the Contract Documents unless such deviations are specifically stated as such on the submittal and specifically allowed by the Engineer.
 - 5. Engineer to return submittals with only cursory review when it becomes apparent the submittal is not acceptable.
- H. Payment And Time For Review Of Excessive Submittals
 - 1. Submittals after first resubmittal:
 - a. Accompanied by Contractor's purchase order to Engineer for all Engineer's review time and costs at Engineer's standard billing rates.
 - b. Be reviewed by Engineer at convenience of the Engineer.
- I. Timeliness
 - 1. All submittals to be submitted to allow final Engineer's review to be completed within the scheduled number of calendar days of date Contract starts.

- a. If submittals not reviewed within the scheduled time:
 - i. Owner may withhold payment if such delay results in a delay in receipt of funding agency funds.
 - ii. Contractor shall not terminate/suspend work.
 - iii. No additional costs or contract time shall be claimed by Contractor.
- 2. No payments made for materials, equipment or supplies for which Engineer's final review of submittal has not been made.
- 3. Materials, equipment or supplies for which Engineer's final review of submittal has not been made shall not be allowed on the job site.
- J. The OWNER'S CONSTRUCTION MANAGER'S and/or ENGINEER'S review of Shop Drawing Submittals shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions and for compliance with the Contract Documents. The CONTRACTOR shall assume all responsibility and risk for any problems due to any errors in Submittals. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.
- K. No changes in the Contract times will be considered for schedule delays resulting from non-compliant Submittals.
- L. Within 30 Days of the Notice to Proceed, the CONTRACTOR shall submit a complete list of anticipated Submittals which includes Specification and Drawing references. The list shall be updated with "early start" Submittal dates within 15 Days of Submittal of the CONTRACTOR'S construction schedule. The Submittal dates shall be updated whenever the schedule is updated. Any additional Submittals identified after the initial Submittal shall be included in the updates.
- M. If the CONTRACTOR submits an incomplete Submittal, the Submittal may be returned without review. A complete Submittal shall contain sufficient data to demonstrate that the items contained therein comply with the Contract Documents, meet the minimum requirements for Submittals as described in the Contract Documents, and include all corrections as required from previous Submittals.

1.05 CONTRACTOR'S SCHEDULE

- A. The CONTRACTOR'S construction schedules and reports shall be prepared and submitted to the OWNER'S CONSTRUCTION MANAGER.

1.06 SAMPLES

- A. Whenever in the Specifications samples are required, submit not less than three samples of each item or material to the OWNER'S CONSTRUCTION MANAGER for acceptance at no additional cost to the OWNER.

- B. Samples, as required herein, shall be submitted for acceptance a minimum of 21 days prior to ordering such material for delivery to the jobsite, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the Work.
- C. All samples shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and Manufacturer's name for identification. Upon receiving acceptance of the ENGINEER, one set of the samples will be stamped, dated, and returned to the CONTRACTOR, and one set of samples will be retained, and one set of samples shall remain at the job site until completion of the Work.
- D. Unless indicated otherwise, all colors and textures of specified items presented in sample Submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time, price, or clearly indicate "same" on the transmittal page of the Submittal.

1.07 SURVEY DATA

The CONTRACTOR shall make available for examination throughout the construction period all field books, notes, and other data developed by CONTRACTOR in performing the surveys required by the Work and shall submit all such data to OWNER'S CONSTRUCTION MANAGER with documentation required for final acceptance of the Work.

1.08 UTILITY INVESTIGATION

The CONTRACTOR shall submit the findings of all utility investigations performed.

1.09 DAILY FORCE REPORT

- A. The CONTRACTOR and each Subcontractor shall submit to the OWNER'S CONSTRUCTION MANAGER, or designee, a daily force report. Deliver report not later than 9:00 A.M. of the workday following the report date and include the following:
 - B. Day of week, date, CONTRACTOR name and Report number.
 - C. Summary of work in progress (segregated by CONTRACTOR and Subcontractor).
 - D. Details of work accomplished including quantities of work installed.
 - E. Summary of equipment working and where working.
 - F. Summary of manpower by work element and Subcontractor.

G. Receipt of major equipment or materials.

H. All required testing performed and, if available, documented results.

PART 2 – PAYMENT

2.01 GENERAL

Costs for the work in this Section shall not be paid for separately, but shall be considered incidental to the Contract work to be accomplished.

END OF SECTION

SECTION 01600
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provision of the contract.

1.02 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products, and includes:

1. Substitution requests.
2. Basis-of-design specification.
3. Single source.
4. Product delivery, storage, and handling.
5. Product warranties.
6. Product options.
7. Product selection procedures.
8. Comparable products.
9. Product Substitutions.

B. The use of a brand name within Supplemental Technical Specifications or as identified on the Plans is for the purpose of describing the standard of quality, performance and characteristic desired and is not intended to limit or restrict competition.

1.03 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the items "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of the effective date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility, except those products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 3. Comparable Products: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product. Burden of proof of acceptability as a comparable product, or better product, is the responsibility of the CONTRACTOR, and shall be fully investigated and documented by the CONTRACTOR prior to submittal to the ENGINEER for consideration.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by CONTRACTOR.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named whether accompanied or not by the words "basis of design," including make or model number or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers. The product named shall be used to judge the minimum standard for compliance of any product used for the application intended. Other products will not be approved for use on the project that are not at least equal to, or better than, the product named; as judged by the ENGINEER.
- D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to OWNER.
- E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for OWNER.

1.04 SUBMITTALS

- A. Substitution Requests: Refer to "Product Substitutions" Article 2.02. With submittal of the bidding documents, the CONTRACTOR shall submit to the ENGINEER via BHITracker® a copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number, title, and Drawing numbers and titles.
1. Substitution Request Form: Use form as provided at the back of this Specification Section. Improperly or incompletely filled out form may be returned to CONTRACTOR, without action by ENGINEER, for correction.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product couldn't be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by OWNER and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of CONTRACTOR'S Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. CONTRACTOR'S certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. CONTRACTOR'S waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. By making request for substitution, when forwarded by the CONTRACTOR to the ENGINEER, the CONTRACTOR:

- a. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 - b. CONTRACTOR and the manufacturer will provide the same, or better, guarantee for the substitution that they would for that specified;
 - c. Certifies that the cost data presented is complete and includes all related costs under this Contract, but excludes costs under any separate contracts and the ENGINEER'S redesign costs, and that he waives all claims for additional costs related to the substitution which subsequently becomes apparent; and;
 - d. Will coordinate the installation of the accepted substitute making such changes as may be required for the Work to be complete in all respects.
4. OWNER and ENGINEER'S Action: The OWNER and ENGINEER may reject or allow substitutions, at their sole judgment and discretion. If necessary, ENGINEER will request additional information or documentation for evaluation within seven calendar days of receipt of a request for substitution. ENGINEER will notify the CONTRACTOR of acceptance or rejection of proposed substitution within 14 calendar days of receipt of request, or seven calendar days of receipt of additional information or documentation, whichever is later.
- a. Form of Acceptance: Submittal marked "No Exceptions Taken".
 - b. Use product specified if ENGINEER does not render a decision on use of a proposed substitution within time allocated.
5. Substitutions will not be considered if:
- a. They are indicated or implied on Shop Drawings, Product Data, or Sample submissions without the formal Substitution Request; or
 - b. For their implementation, they require a substantial revision of the Contract Documents or work of the OWNER or separate Contractors in order to accommodate their use.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01300 – Contractor Submittals.

1.05 QUALITY ASSURANCE

- A. Compatibility of Options: If CONTRACTOR is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- B. Single Source: All materials or products related to a specified warranty shall be from the same prime product manufacturer, or approved in writing by the prime

product manufacturer, and installed by the same entity; providing the OWNER with a single source system warranty.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Store products to allow for inspection and measurement of quantity or counting of units.
 - 6. Store materials in a manner that will not endanger Project structure.
 - 7. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
 - 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 9. Protect stored products from damage.
- B. Storage: Provide a secure location and enclosure, as necessary, at Project site for storage of materials and equipment by OWNER'S construction forces. Coordinate location with OWNER.

1.07 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, and Manufacturer's standard warranty. Manufacturer's disclaimers and limitations on product warranties do not relieve CONTRACTOR of obligations under requirements of the Contract Documents.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer’s Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate for properly executed.
 - 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in COA General Conditions Section 13 “Warranty and Guarantee.”

PART 2 PRODUCTS

2.01 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. OWNER reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term “as selected,” ENGINEER will make selection.
 - 5. Where products are accompanied by the term “match sample,” sample to be matched is ENGINEER’S.
 - 6. Descriptive, performance, and reference standard requirements in the Specifications establish “salient characteristics” of products.
 - 7. Or Equal: Where a product is specified and accompanied by the term “or equal” or “or approved equal” or “or approved,” or similar language; comply with provisions in “Comparable Products” and “Substitution Requests” requirements to obtain approval for use of an unnamed product. The term “equal” shall not be construed as requiring products to be exact in every

characteristic, unless the ENGINEER determines that exact matching of all characteristics is required for the intended result. The term “equal” shall, subject to the ENGINEER’S interpretation, mean generally equivalent in essential features for quality and performance for the intended result. The ENGINEER shall be the sole judge of the essential features for quality and performance, and the intended result.

- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled “product” name a single product and manufacturer, provide the product named.
 - a. Substitutions may be considered, unless otherwise indicated as “no substitute,” or similar wording.
 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled “Manufacturer” or “Source” name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated as “no substitute,” or similar wording.
 3. Products: Where Specification paragraphs or subparagraphs titled “products” introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated as “no substitute,” or similar wording.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled “Manufacturers” introduce a list of manufacturers’ names, provide a product by one of the manufacturers listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated as “no substitute,” or similar wording.
 5. Available Products: Where Specification paragraphs or subparagraphs titled “Available Products” introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in “Comparable Products” and “Substitution Request” Articles to obtain approval for use of an unnamed product.
 6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled “Available Manufacturers” introduce a list of manufacturers’ names, provide a product by one of the manufacturers listed or another manufacturer

that complies with requirements. Comply with provisions in “Comparable Products” and “Substitution Requests” Articles to obtain approval for use of an unnamed manufacturer’s product.

7. Product Options: Where Specification paragraphs titled “Product Options” indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in “Comparable Products” Article.
8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled “Basis-of-Design Products” are included and also introduce or refer to a list of manufacturers’ names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in “Comparable Products” and “Substitution Requests” Article to obtain approval for use of a product.
 - a. Substitutions will not be considered, unless otherwise indicated
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches ENGINEER’S sample. ENGINEER’S decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of “Product Substitutions” for selection of a matching product.
10. Visual Selection Specification: Where Specifications include the phrase “as selected from manufacturer’s colors, patterns, textures” or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase “standard range of colors, patterns, textures” or similar phrase, ENGINEER will select color, pattern, or texture from manufacturer’s product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase “full range of colors, patterns, textures” or similar phrase, ENGINEER will select color, pattern, or texture from manufacturer’s product line that includes both standard and custom or premium items.

2.02 PRODUCT SUBSTITUTIONS

- A. Timing: Refer to “Substitution Requests.” ENGINEER will consider requests for substitution if received during the submittal of the bid for the project. Requests received after that time may be considered or rejected at discretion of ENGINEER. After that time, CONTRACTOR has the burden of proof that the substitution is requested due to events or specified product unavailability beyond the CONTRACTOR’S control.

- B. Conditions: ENGINEER will consider CONTRACTOR’S request for substitution when, in the ENGINEER’S judgment, the following conditions are satisfied. If the following conditions are not satisfied, ENGINEER will return requests without action, except to record noncompliance with these requirements:
 - 1. Requested substitution offers OWNER a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities OWNER must assume. OWNER’S additional responsibilities may include compensation to ENGINEER for redesign and evaluation services, increased cost of other construction by OWNER, and similar considerations.
 - 2. Requested substitution does not require extensive revisions to the Contract Documents.
 - 3. Requested substitution is consistent with the Contract Documents and will produce indicated or better results.
 - 4. Substitution request is fully documented and properly submitted.
 - 5. Requested substitution will not adversely affect CONTRACTOR’S Construction Schedule.
 - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - 7. Requested substitution is compatible with other portions of the Work.
 - 8. Requested substitution has been coordinated with other portions of the Work.
 - 9. Requested substitution provides specified or better warranty.
 - 10. Requested substitution is due to events or specified product unavailability beyond the CONTRACTOR’S control.

2.03 COMPARABLE PRODUCTS

Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named on the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified or better warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
5. Samples, if applicable, or requested.

PART 3 EXECUTION

3.01 CONTRACTOR SUBSTITUTION REQUEST FORM IS ATTACHED.

PART 4 PAYMENT

- 4.01 Costs for the work in this Section shall not be paid for separately but shall be considered incidental to the contract work to be accomplished.

END OF SECTION

CONTRACTOR SUBSTITUTION REQUEST FORM

The undersigned, as CONTRACTOR for the above project, requests that the following product be accepted for use in the Project in lieu of _____ Specified in Section _____

PRODUCT: _____

MODEL NO: _____

MANUFACTURER: _____

ADDRESS: _____

Reason for substitution request is as follows: _____

The following items are attached:

- Product description including specifications, performance and test data, and applicable reference standards.
- Samples
- Tabulated comparison with specified product.
- Documentation of reason for request.
- Cost data for comparing proposed substitution with specified product.
- Other: _____

The undersigned certifies that unless stated otherwise:

- Proposed substitution has been thoroughly investigated and function, appearance and quality meet or exceed that of specified product.
- Same warranty will be provided for substitution as for specified product.

Use of substitution will not adversely affect:

- Dimensions shown on Drawings.
- Construction schedule and date of completion.
- Work of other trades.
- Maintenance service and replacement parts for proposed substitution will be readily available in the Aztec area.

Any changes to Contract Sum related to use of proposed substitution are included in price listed below. CONTRACTOR waives claims for additional costs related to acceptance of substitution which may subsequently become apparent.

Costs of modifying project design caused by use of proposed substitution which subsequently become apparent will be paid for by CONTRACTOR.

If substitution request is accepted:

- Contract Sum will be (decreased, increased) by \$ _____
- Contract Time will be (decreased, increased)by _____ calendar days

Submitted By:

CONTRACTOR/SUPPLIER

ADDRESS: _____

TELEPHONE NUMBER: _____

NAME OF PERSON SUBMITTING REQUEST: _____

TITLE: _____ DATE: _____

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1. SECTION INCLUDES

- A. Contract Closeout Procedures and Submittals.

1.2. CLOSEOUT PROCEDURES

- A. Upon completion of the work certify that:
 - 1. Contract Documents have been reviewed;
 - 2. Work has been inspected for compliance with Contract Documents;
 - 3. Work has been completed in accordance with the Contract Documents;
 - 4. Equipment and systems have been tested as required, and are operational;
 - 5. Work is completed and ready for final inspection.
- B. Should the work be found to be incomplete or defective, the ENGINEER will notify the CONTRACTOR in writing, listing the incomplete or defective work.
- C. Correct the deficiencies promptly and notify the ENGINEER when the work is ready for re- inspection.
- D. When the work is determined to be acceptable, the ENGINEER will request the CONTRACTOR to make closeout submittals.

1.3. FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances.
- C. Clean equipment and fixtures to a sanitary condition.
- D. Clean filters of operating equipment.
- E. Clean site; sweep paved areas.
- F. Remove waste and surplus materials, rubbish, and construction facilities from

the site.

1.4. TRAINING

- A. Prior to final inspection or acceptance, fully instruct OWNER-designated personnel in the operation, adjustment and maintenance of equipment and systems.
- B. Use maintenance and operating manuals as the basis of instruction.
- C. Perform training by instructors skilled in the operation of equipment. Use equipment manufacturers' representatives to provide instruction for major equipment.

1.5. TRANSMITTAL OF SUBMITTALS

- A. Transmit submittals per Section 01300, Submittals.

1.6. CONTRACT CLOSEOUT SUBMITTAL REQUIREMENTS

- A. Prepare and submit Contract Closeout Submittals per Section 01300 – Contractor Submittals.
- B. Contract Closeout Submittals will be reviewed and returned per Section 01300 – Contractor Submittals.

1.7. DEFINITION OF CONTRACT CLOSEOUT SUBMITTAL TYPES

- A. Provide the following types of Contract Closeout Submittals:
 - 1. Maintenance and Operating Manuals and Instructions/Data.
 - 2. Warranties and Software Licenses.
 - 3. Project Record Documents.
 - 4. Final Application for Payment.
 - 5. Consent of Surety.
 - 6. List of all Claims.
 - 7. Release of liens or waivers.
 - 8. Certification of Labor Standards for Required Closeout Submittals.
 - 9. Project Acceptance

10. Record Drawings and O&M Acceptance

B. Forms 8-10 are included at the end of this specification.

1.8. SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual specification sections prior to final acceptance.
- B. Deliver to project site and place in location as directed by ENGINEER; obtain receipt prior to final payment.

1.9. PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - 1. Contract 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 Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to visible and accessible features of the Work.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract Drawings.

F. Submit documents to ENGINEER with final Application for Payment

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

PART 4 - MEASUREMENT AND PAYMENT

4.1. GENERAL

Costs for the work in this section shall be incidental to the project. No separate payments shall be made.

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Compile product data and related information appropriate to Contractor's installation and for Owner's maintenance and operation of products furnished under the Contract.
- B. Prepare operating and maintenance data, as specified in this Section and as referenced in other pertinent sections of Specifications.
- C. Coordinate with manufacturer's representatives as necessary to organize training to Owner's personnel in the operations and maintenance of installed products.
- D. Video tape all training sessions and provide to Owner.

1.02 RELATED WORK

- A. Section 01300: Contractor Submittals
- B. Section 01600: Product Requirements

1.03 SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Final Hard Copy Manual Format:
 - 1. Size: 8½" x 11".
 - 2. Paper: 20 lb minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data.
 - 4. Drawings:
 - a. Provide reinforced, punched binder tab; bind in with text.
 - b. Reduced to 8½" x 11", or 11" x 17" folded to 8½" x 11".
 - c. Where reduction is impractical, folded and placed in 8½" x 11" envelopes bound in text.

- d. Suitably identified on Drawings and envelopes.
5. Provide fly leaf for each separate product or each piece of operating equipment.
 - a. Provide typed description of product and major component parts of equipment.
 - b. Provide indexed tabs.
6. Cover: Fill out the Cover Sheet provided in this Section.
7. Assembly:
 - a. Assemble and bind material in the order specified in Paragraph 2.01.
 - b. Material grouped in the same manner as the applicable portions of the Contract Documents.
 - c. Binders: Final manuals shall be bound using commercial-quality, substantial, permanent, 3 ring or 3 post binders with durable, cleanable plastic covers of adequate size to easily contain required information.

C. Digital Files of Manuals

1. Preliminary and Final manuals to be digitally uploaded to ProjectTracker®.
2. Electronic copy of the entire Final Manuals on USB Drive in PDF format.
3. USB Drive permanently labeled to identify contents specific to this project.

D. Digital Files of Training

1. Video files in MOV, AVI or MP4 format.

E. Digital Files of All programs for software

1.04 QUALITY ASSURANCE

A. Manuals for equipment and systems shall be prepared by the equipment manufacturer or system supplier, with following qualifications:

1. Trained and experienced in maintenance and operation of the described products.
2. Completely familiar with requirements of this Section.
3. Skilled as technical writers to the extent required to communicate essential data.
4. Skilled as draftsmen competent to prepare required Drawings.

PART 2 PRODUCTS

2.01 CONTENT OF MANUALS

- A. The manuals shall be custom-made for all of the equipment specified for the job conditions at the project site.
- B. Neatly typed table of contents for each volume, arranged in a systematic order.
 - 1. Contractor, name of responsible principal, address and telephone number.
 - 2. A list of each product required to be included, indexed to the content of the volume.
 - 3. List, with each product, the name, address and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance Contractor, as appropriate.
 - c. Identify the area of responsibility of each.
 - d. Local source of supply for parts and replacement.
 - e. Manufacturer.
 - 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- C. Product Data:
 - 1. Include only those sheets which are pertinent to the specific product.
 - 2. Annotate each sheet to:
 - a. Clearly identify the specific product or part installed.
 - b. Clearly identify the data applicable to the installation.
 - c. Delete references to inapplicable information.
 - 3. Preventive maintenance information shall be given for each major component of every piece of equipment as indicated in Schedule.
- D. Drawings:
 - 1. Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 - 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 - 3. Do not use Project Record Documents as maintenance drawings.

- E. Written text as required to supplement product data for the particular installation:
 - 1. Organize in a consistent format under separate headings for different procedures.
 - 2. Provide a logical sequence of instructions for each procedure.
- F. Copy of each warranty, bond and service contract issued: Provide information sheet for Owner's personnel:
 - 1. Proper procedures in the event of failure.
 - 2. Instances which might affect the validity of warranties or bonds.
- G. Provide an installation and Operations and Maintenance Manual for each item of equipment or system specified in the Schedule, in the quantity listed in the submittal schedule.
- H. Content for each unit of equipment and system, as appropriate.
 - 1. Description of unit and component parts:
 - a. Function, normal operating characteristics and limiting conditions
 - b. Performance curves, engineering data and tests
 - c. Complete nomenclature and commercial number of all replaceable parts
 - 2. Manufacturer's complete installation instructions and recommendations.
 - 3. Operating procedure:
 - a. Startup, break in, routine and normal operating instructions
 - b. Regulation, control, stopping, shutdown and emergency instructions
 - c. Summer and winter operating instructions, as applicable
 - d. Special operating instructions
 - 4. Maintenance procedures:
 - a. Routine operations
 - b. Guide to troubleshooting
 - c. Disassembly, repair and reassembly
 - d. Alignment, adjusting and checking
 - e. Provide preventive maintenance information for each major component of every piece of equipment
 - 5. Servicing and lubrication schedule:
 - a. List of lubricants required

- b. Provide lubrication information for each major component of every piece of equipment.
 - 6. Manufacturer's printed operating and maintenance instructions.
 - 7. Description of sequence of operation.
 - 8. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear
 - b. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 - 9. As installed control diagrams.
 - 10. Other data as required under pertinent sections of Specifications.
- I. Content, for each electric and electronic item or system, as appropriate:
 - 1. Description of system and component parts:
 - a. Function, normal operating characteristics and limiting conditions
 - b. Performance curves, engineering data and tests
 - c. Complete nomenclature and commercial number of replaceable parts
 - 2. Circuit directories of panelboards:
 - a. Electrical service
 - b. Controls
 - c. Communications
 - 3. As installed color-coded wiring diagrams.
 - 4. Operating procedures:
 - a. Routine and normal operating instructions
 - b. Sequences required
 - c. Special operating instructions
 - 5. Maintenance procedures:
 - a. Routine operations
 - b. Guide to troubleshooting
 - c. Adjustment and checking
 - 6. Manufacturer's printed operating and maintenance instructions.
 - 7. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 - 8. Other data as required under pertinent sections of Specifications.

- J. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel, or as necessary to provide complete operations and maintenance instructions.
- K. Include any additional requirements for operating and maintenance data for all installed equipment as necessary.

2.02 SUBMITTAL SCHEDULE

- A. Submit Preliminary O&M Manuals prior to the date of shipment of the equipment or system for review and approval purposes.
 - 1. Digital upload of the Preliminary Manual file complete with all cover sheets, titles, text, and drawings to ProjectTracker®.
 - 2. Once the Engineer has determined that a manual is not acceptable, the remainder of the manual shall not be reviewed in detail.
- B. If the Preliminary Manual is found unacceptable, submit a revised Preliminary Manual as follows:
 - 1. Digital upload of the Revised Preliminary Manual file complete with all cover sheets, titles, text, and drawings to ProjectTracker®.
 - 2. Once the Engineer has determined that a manual is not acceptable, the remainder of the manual shall not be reviewed in detail.
- C. When the Preliminary Manual is found acceptable, submit Final O&M Manuals as follows:
 - 1. Digital upload of the Final Manual file complete with all cover sheets, titles, text, and drawings to ProjectTracker®
 - 2. Two paper copies printed and bound in a binder complete with all text, drawings, and separated with index tabs.
 - 3. Two CDs with all files.
- D. No partial payments shall be made for equipment and systems, either on hand or installed, until preliminary manuals are submitted and acceptable to the Engineer.
- E. Funding:
 - 1. Agency funds may be withheld from Owner if Owner's acceptable operations and maintenance manual is not submitted as required by the agencies.
 - 2. If funds are withheld and such is partially attributable to a delay by the Contractor in submitting the required operations and maintenance materials:
 - a. Owner may withhold payments from Contractor.

- b. Contractor shall not terminate or suspend work.
- c. No additional costs or contract time shall be claimed by Contractor if Owner withholds payments.

2.03 REIMBURSEMENT FOR ENGINEER'S REVIEW COSTS

- A. For all manual reviews beyond one review of the Preliminary Manual and one review of Final Manual:
 - 1. Contractor shall submit purchase order to pay Engineer at Engineer's standard billing rates for all costs associated with review.
 - 2. Engineer shall perform these unscheduled reviews in the same manner as other unscheduled work.

2.04 TRAINING OF OPERATIONS AND MAINTENANCE PERSONNEL

- A. Hard copies of all manuals shall be available for the Owner's personnel during the training.
- B. If training is given before equipment is completely operational, representative shall have to repeat training after equipment is fully operational.
- C. If the Engineer judges the instruction to be incomplete, inadequate, or inaccurate, additional instruction shall be scheduled and provided at no additional cost to the Owner.

2.05 VIDEOTAPING OF TRAINING

- A. The SUS shall coordinate videotaping the manufacturers' onsite training and start-up instructions to the Owner's personnel.
- B. As scheduled, the Contractor shall video record the equipment manufacturer's instruction to the Owner's personnel.
- C. For instruction to be video recorded, persons providing the instruction shall:
 - 1. Provide to Engineer the following:
 - a. When instruction is to be scheduled.
 - b. Detailed outline of topics, materials, procedures, information, etc. to be covered during instruction.
 - 2. Provide high definition 1080p minimum video file with high definition audio and stable picture. Coordinate with Owner for acceptable format.

3. Ensure audio is clear and comprehensible, background noise is minimal. Ensure lighting is sufficient to reduce glare and light presentation satisfactorily.

2.06 SCHEDULE

- A. Submit O&M Manuals for the following equipment and systems:
 1. Section 02641: Valves
 2. Section 02776: HDPE Geomembrane Liner and Warranty
 3. Section 15050: Miscellaneous Pipe and appurtenances
 4. Section 15103: Fabricated Headwall Slide Gates
 5. Section 15420: Ductile Iron Pipe
 6. Section 16993: Process Field Instruments
- B. Submit the Project Title sheet with each O&M Manual. See sample page included after this Section.

END OF SECTION

SECTION 02641
VALVES

PART 1 - GENERAL

1.01 SCOPE

This section of the specifications shall be supplemental to Sections 801.3.4 to 801.3.7 of the Standard Specifications. All requirements of Section 801 shall apply except as modified herein.

The work covered by this section includes motor operated butterfly valves, check valves, pump control valves, and miscellaneous manual valves.

1.02 RELATED WORK

- A. Section 09901 – Painting and Coating
- B. Section 09961 - Fusion Bonded Epoxy Linings and Coatings

1.03 SUBMITTALS

Shop drawing submittals shall be in accordance with Section 01300 of these specifications.

1.04 REFERENCES

Standard references shall conform to the current edition of the AWWA Specifications, C-504.

PART 2 - PRODUCTS

2.01 MISCELLANEOUS SMALL VALVES

- A. Gauge Cock: Val-Matic No. 600, size as required.
- B. Corporation Stops: Ford, F-600, size as required.
- C. Ball Valves:
 - 1. Val-Matic No. 600, size as required.
 - 2. Plast-O-Matic, True Blue, MVP[XXX]VT-CP, size as required.

2.02 AWWA (RESILIENT) SEAT GATE VALVES (4" through 48")

- A. General
 - 1. All resilient seat gate valves shall be full compliance with the latest

revision of AWWA Standard C515 except as modified herein.

B. Valve Bodies

1. All gate valve iron components shall be manufactured from Ductile Iron in compliance with ASTM A536.
 - a. Fusion Bond Epoxy Coated Interior and Exterior, AWWA C550. Epoxy powder certified to NSF-61.
 - b. Stuffing Box Gland shall have a minimum of three (3) O-rings capable replacement under pressure while gate is in the full open position.
 - c. EPDM O-ring Seals shall be located between Stuffing box Gland, Bonnet, and Body.
 - d. Wedge Nut shall be C-54400 bronze cast integrally to a ductile iron gate with a fully Encapsulated Rubber EPDM Seat.
 - e. Mechanical joint shall be in accordance with ANSI /AWWA C111 / A21.11 Standard; flanged faced ends shall be in accordance with AWWA C110/A21.10 / ANSI B16.1, 125 lb. drilling pattern.
 - f. Mechanical joints and flanged faced ends shall be provided as required in the Drawings.

C. Operating Stems

1. Operating Stem shall be 420 stainless steel with (3) machined grooves located just above the lower stem O-ring to accept and mate with a 2-piece bronze C-54400 split ring.

D. Pressure Classes

1. Valves contained in these specifications shall be designed to provide a tight shut-off with a minimum differential across the valve of 200 psi. The classification state above is as described in AWWA C515, Section 1.1.2.

E. Maximum Input Torque

1. The maximum input torque to open and/or close the valve shall not exceed 150ft-lbs under the minimum working pressure stated in these specifications

F. Manufacturers

1. Rubber seated butterfly valves shall be manufactured by American Flow Control, United Water Products or Engineer Approved Equal.

2.03 MANUAL OPERATORS

- A. Manual operators shall be of the worm gear or traveling nut type, utilizing spur or bevel gearing as necessary to produce a maximum input of 150 ft. - lbs. to the driver. Operators shall meet the specified torque requirements as listed in Table 1 AWWA C504. The housing and cover plate shall be cast steel and provide a watertight construction. The driver assembly shall comply to AWWA C504 strength and operations. The valve shall be supplied with a handwheel. The operator shall be supplied with an external position indicator. Extension stems and stem guides shall be as manufactured by Pratt, Mueller or approved equal. All butterfly valve operators shall be capable of being maintained in any position between full open and full close and shall be as manufactured by Pratt, Mueller or ValMatic.

2.04 PAINTING

- A. Coat metal valves and accessories located above ground or in vaults and structures per Specification Section 09901: PAINTING AND COATINGS Apply the specified prime coat at the place of manufacture. Finish coat shall match the color of the adjacent piping. Coat handwheels the same as the valves.
- B. Line the interior and exterior metal parts of metal valves 4 inches and larger, excluding seating areas and bronze and stainless-steel pieces, according to Specification Section 09961 – FUSION BONDED EPOXY LININGS AND COATINGS.
- C. Test the valve interior linings at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000-ohm resistance) holiday detector, using a sponge saturated with a 0.5% sodium chloride solution. The lining shall be holiday free.
- D. Repair fusion bond epoxy coated areas according to Specification Section 09961 - FUSION BONDED EPOXY LININGS AND COATINGS.

PART 3 - EXECUTION

3.01 JOINTS

- A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
- B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

- C. Install grooved-end couplings for valves in accordance with the coupling manufacturer's recommendations. Clean rust, oil, grease, dirt, and loose scale from the pipe and valve grooves before installing coupling. Apply the coupling manufacturer's gasket lubricant to the gasket exterior including lips, pipe ends, and housing interiors. Fasten coupling alternately and evenly until coupling halves are seated.

3.02 INSTALLING EXPOSED VALVES

- A. Unless otherwise indicated in the drawings, install valves in horizontal runs of pipe having centerline elevations 4'-6" or less above the floor with their operating stems vertical. Install valves in horizontal runs of pipe having centerline elevations between 4'-6" and 6'-9" above the floor with their operating stems horizontal.
- B. Install valves on vertical runs of pipe that are next to walls with their stems horizontal, away from the wall. Valves on vertical runs of pipe that are not located next to walls shall be installed with their stems horizontal, oriented to facilitate valve operation.

3.03 MOUNTING ACTUATORS

- A. The valve manufacturer shall select and mount the actuator and accessories on each valve and stroke the valve from fully open to fully closed prior to shipment.

3.04 FIELD INSTALLATION OF ACTUATOR

- A. Provide the actuator manufacturers recommended lubricating oil in each actuator before commencing the field testing.

3.05 VALVE LEAKAGE TESTING

- A. Test valves for leakage at the same time that the connecting pipelines are tested. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any valves and retest.

3.06 VALVE FIELD TESTING

- A. Operate manual valves through 10 full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. If valves stick or bind, repair or replace the valve and repeat the tests.
- B. Actuators shall operate valves from full open to full close through 10 cycles without binding or sticking. The pull required to operate handwheel- or chainwheel-operated valves shall not exceed 80 pounds. The torque required to operate valves having 2-inch AWWA nuts shall not exceed 150 ft-lbs. If actuators stick or bind or if pulling forces and torques exceed the values stated previously, repair or replace the actuators and repeat the tests. Operators shall be fully

lubricated in accordance with the manufacturer's recommendations prior to operating.

3.07 VALVE PRESSURE TESTING

- A. Test valves at the same time that the connecting pipelines are pressure tested. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure.

3.08 MEASUREMENT AND PAYMENT

- A. Work covered in this section of the specifications, and associated costs therewith, shall be included in the lump sum bid item to which the work applies. No separate payment shall be made.

END OF SECTION

SECTION 02776
HIGH DENSITY POLYETHYLENE (HDPE) LINER

PART 1 GENERAL

1.01 WORK INCLUDED

Furnish, install, modify and repair High Density Polyethylene (HDPE) liner.

1.02 RELATED WORK

Section 01300: Contractor Submittals

1.03 QUALIFICATIONS OF CONTRACTOR WORK ACTIVITIES

A. Manufacturing:

1. Shall be listed by the National Sanitation Foundation (NSF) as having met Standard 54 for Flexible Liners.
2. Shall have at least five (5) years continuous experience in the manufacturer of HDPE liner and/or experience totaling a minimum of 10,000,000 square feet of manufactured HDPE liner.

B. Installation:

1. Installation CONTRACTOR shall be approved by the MANUFACTURER, trained and licensed to install the membrane.
2. Installation shall be performed under the constant direction of a single Field Installation Supervisor. Field Installation Supervisor (FIS) shall:
 - a. Have installed or supervised the installation and seaming of a minimum of 1,000,000 sq. ft. of HDPE liner.
 - b. Directly supervise the performance of the seaming.
 - c. Be present whenever seaming is performed.

1.04 SUBMITTALS

- A. Repair and modifications layout identifying seams and details.
- B. Any variation or deviation from these documents shall be submitted to the representative approved by the OWNER a minimum of seven (7) working days prior to schedule start of liner installation and must be accepted/rejected by the representative approved by the OWNER prior to start of installation.

- C. Installer shall certify, in writing that the surface on which the liner is to be installed is acceptable.

1.05 WARRANTY

- A. A written warranty shall be obtained from the Manufacturer (for material) and the Installation Contractor (for workmanship). These documents shall warrant the quality of the repairs and modifications for 20 years on a pro-rated basis and workmanship for 12 months from date of substantial completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Liner shall be 60 mil High Density Polyethylene (HDPE) textured, or matching the mil thickness of the existing liner, whichever is greater.
- B. Metal battens or straps and hardware shall be stainless steel.
- C. Concrete shall be 4000 psi unless indicated otherwise and contain reinforcement as indicated on the drawings.

2.02 MANUFACTURER

- A. Titan Environmental Containment
- B. GSE Lining Technology, Inc.
- C. National Seal Company.
- D. Poly-Flex, Inc.
- E. Engineer approved equal.

2.03 ROLLS

- A. Thickness shall match existing liner thickness, or 60 mil HDPE, whichever is greater, textured.
- B. Carbon black shall be added to the resin if the resin is not compounded for ultra-violet resistance.
- C. Shall meet the following properties:

60 mil - HDPE LINER TESTED PROPERTIES

Property	Test Method	Test Frequency	60 mil Minimum
Thickness, mils (min avg)	ASTM D5994	Every roll	57
Density, (g/cm ³)	ASTM D1505	200,000 lb.	0.94
Carbon Black Content, %	ASTM D1603	20,000 lb.	2.0-3.0
Tensile Properties	ASTM D6693, Type IV	20,000 lb.	126
Strength at Yield, ppi			90
Strength at Break, ppi			12
Elongation at Yield, %			100
Elongation at Break, %			
Tear Resistance, lbs.	ASTM D1004	45,000 lb.	42
Puncture Resistance, lbs.	ASTM D4833	45,000 lb.	90
Oxidative Induction Time, minutes	ASTM D3895, 200°C Pure O ₂ , 1 atm	200,000 lb.	>100
Carbon Black Dispersion	ASTM D5595	45,000 lb.	Note 1

Notes: 1) Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

60 mil - HDPE LINER REFERENCE PROPERTIES

Property	60 mil Nominal
Roll Length(approx.), ft	530
Roll Width, ft.	22.5

2.04 MATERIAL SEAMING - FUSION (WEDGE) WELDING

- A. Field seams are to be made using the fusion (wedge) method whenever possible.
- B. Each day, prior to seaming any materials, test seams shall be made. At least three peel and shear tests are to be conducted on each test seam, using a field tension meter furnished by the Installer. Upon completion of a successful test, the FIS will record the date, time, weather conditions, seamer name, seaming machine number, machine temperature setting, machine speed setting, and test results. No seaming is to be done

until a successful test seam has been completed and recorded. Seam test results are to be recorded in the project log.

- C. Additional test seams are required if a substantial change in weather conditions occurs or if the seaming machine is turned off for more than ten (10) minutes.
- D. The area to be seamed is to be clean and dry. If required, a protective layer is to be placed under the seam to prevent dust or moisture from entering the seam area.
- E. At the start of each seam, the machine operator is to mark the date, time, machine number, machine temperature, machine speed, and operator initials on the lining material with a permanent marker. This information is to be recorded in the project log by the FIS.
- F. The machine operator is responsible for insuring that the area to be seamed is clean and dry. If any questionable seam areas are noted, the operator is to mark these areas for later inspection and testing.
- G. The machine operator is to read the machine temperature at intervals of approximately 100 feet, and mark the temperature on the lining material. The procedure will insure that seams are made at the proper temperature. If a low temperature reading is noted, the operator is to stop seaming and mark the affected area for testing. The cause of the problem is to be located and corrected before seaming resumes.

2.05 MATERIAL SEAMING - EXTRUSION WELDING

- A. Extrusion welding is to be used for detail work, repairs, and in other areas where wedge welding cannot be used.
- B. Each day, prior to seaming any materials, test seams shall be made. At least three peel tests are to be conducted on each test seam, using field tensiometer furnished by the installer. Upon completion of a successful test, the representative approved by the OWNER will record the date, time, weather conditions, seamer name, seaming machine number, machine temperature setting, and test results. No seaming is to be done until a successful test seam has been completed and recorded. The seam test results are to be recorded in the project log.
- C. Areas to be extrusion welded are to be clean and dry. Surface oxidation is to be removed by grinding not more than one hour prior to the time the extrusion weld is made.
- D. Extrusion welds are to be tested by use of a vacuum box. A soap solution is applied to the area to be tested, and a vacuum applied to the area. The tested area is then observed for soap bubbles. Any defective areas must be marked, repaired, and retested until passing results are achieved.

2.06 AIR PRESSURE TESTING

- A. Wedge welded seams consist of a double seam with an air channel between the seams. Upon completion of a wedge seam, the open ends of the air channel are sealed off and a needle inserted into the air channel. The air channel is pressurized, allowed to stabilize, and the initial pressure reading taken.
- B. The minimum starting test pressure is 30 PSIG. The maximum allowable pressure drop during the five minute test is 4 PSIG.
- C. After five (5) minutes, the final pressure reading is taken. The date, test start and ending times, and starting and ending pressures are to be written on the material with a permanent marker. This information is also to be recorded in the project log.
- D. If a wedge welded seam area does not pass the air pressure test, the cause of the failure is to be located and repaired, and the seam is to be re-tested. If the causes of the failure cannot be located, the failed seam area must be sealed with an extrusion weld and vacuum tested.
- E. If the seam fails in more than two locations, the CONTRACTOR shall do another seam test as outlined in Section 2.04.

2.07 SEAM TESTING

- A. The following values are considered acceptable for seam tests. All values are expressed in pounds per inch of material width. All testing is done at the speed of two (2) inches per minute.

MATERIAL: 60 mil HDPE

<u>Weld Type</u>	<u>Peel Strength</u>	<u>Shear Strength</u>
Fusion (Wedge)	91	120
Extrusion	78	120

2.08 FIELD SEAM TESTING

- A. Shear and peel test shall result in Film Tearing Bond (FTB) which is a failure in ductile mode of one of the bonded sheets by tearing prior to complete separation in the bonded area.
- B. Seam specimens are one inch wide with a grip separation of 4 inches plus the width of the seam. The seam is to be centered between the clamps. The rate of grip separation is 2 inches per minute.

- C. Both shear and peel tests shall be performed on five replicate specimens. Test results are the average of five specimens. Four out of five specimens shall pass.
- D. Welding rods or beads used for extrusion welding shall be the same as those of the resin used in the manufacture of the liner.

2.09 PROJECT DOCUMENTATION

- A. The FIS will maintain the following documentation on a daily basis:
 - 1. Log of job activities, including number of personnel, weather conditions, amount of subgrade ready for liner, quantity of liner deployed, and seams completed.
 - 2. Log of seaming activities, including test and field seams.
 - 3. Listing of material placement, including sheet size and placement, and a cross reference of sheets to roll numbers.
 - 4. Listing of pressure tests of wedge seams.
 - 5. Listing of patches and repairs, including location, and reason for the repair.
 - 6. If sample seams have been taken for third party testing, a listing of the sample number, sample size and location, and the results of any field tests done on the samples.
- B. At the completion of the project, the following documentation is to be provided to the OWNER:
 - 1. Copies of Items A.1, A.2, and A.3 listed above.
 - 2. If required by the project specifications, copies of material certifications from the lining manufacturer.
 - 3. Copies of as built drawings showing sheet locations, seam locations, patch locations and sizes, and the reason for the patches.

PART 3 INSTALLATION

3.01 UNLOADING/STORAGE

- A. HDPE rolls are to be unloaded under supervision of the liner installer using straps or other devices that will prevent damage to the liner material.
- B. HDPE Rolls should be stored on wooden supports that will not damage the material. Wooden pallets or crates shall not be used. Rolls are to be blocked to prevent movement.

- C. If any material damage is noted during unloading, the damaged areas are to be marked with a permanent marker, and a notation made as to the roll number, location of damage, and type of damage.

3.02 ANCHOR TRENCH

- A. Shall be excavated to the line, grade and width shown on the drawings prior to liner placement.
- B. The anchor trench shall be backfilled and compacted by the CONTRACTOR with select fill as shown on the drawings.
- C. If clay is encountered in the trench, no more than the amount of trench required for the base lines to be anchored in one day shall be excavated to minimize desiccation of the soils.
- D. The liners shall be protected during backfilling.
- E. Construction equipment shall not come into direct contact with the liner.
- F. Corners shall be slightly rounded in the trench where the liner adjoins the trench to avoid sharp bends in the liner.
- G. If damage occurs, the installer shall repair it prior to completion of backfilling.

3.03 METHOD OF PLACEMENT

- A. It is the installer's responsibility to notify the representative approved by the OWNER of any change to the surface condition due to natural cause or occurrences that may require repair work prior to the installation of any liner material.
- B. No equipment or tools shall damage the liner by handling, trafficking, or other means.
- C. No personnel working on the liner shall smoke, wear damaging shoes, or engage in other activities that could damage the liner.
- D. Unrolling the material shall not cause scratches or crimps in the liner and shall not damage the supporting soil.
- E. Placement of panels shall minimize wrinkles.
- F. Sand bags or similar items that will not damage the liner and shall be placed to prevent uplift by wind.
- G. Direct contact with the liner shall be minimized.
- H. Traffic areas shall be protected by extra liner or other suitable materials.
- I. Liner placement shall proceed between ambient temperatures of 32°F to 104°F.

- J. Liner placement shall not proceed during precipitation, in the presence of excessive moisture, or excessive winds.

3.04 FIELD SEAMING

- A. Seams shall be oriented parallel to the line of maximum slope.
- B. The number of field seams shall be minimized in corners and odd-shaped geometric locations.
- C. No base T-seam shall be closer than 5 feet from the toe of the slope.
- D. Seams shall be aligned with the least possible number of wrinkles or fishmouths. They shall be relieved and cap-stripped if found.
- E. Seam Overlap.
 - 1. Panels of liner must have a finished overlap of a minimum of 4 inches for hot shoe fusion welding and 3 inches for extrusion welding.
 - 2. No solvent or adhesive may be used unless the product is approved by the representative approved by the OWNER.
 - 3. The procedure used to temporarily bond adjacent panels together shall not damage the liner.
- F. Seaming Equipment and Accessories shall be hot shoe fusion welders and extrusion welders.
- G. Defects and repairs.
 - 1. All seams and non-seam areas of the liner shall be inspected by the FIS for defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter.
 - 2. The surface of the liner shall be clean at the time of inspection.
- H. Repair Procedures.
 - 1. Small holes shall be repaired by extrusion cap welding.
 - 2. Holes larger than 3 inch shall be patched.
 - 3. Tears shall be repaired by patching. Where tears occur on a slope or area of stress, the sharp end shall be rounded prior to patching.
 - 4. Blisters, large holes, undispersed raw materials and contamination by foreign matter shall be repaired by patches.

5. Surface to be patched shall be abraded and cleaned no more than 10 minutes prior to the repair. No more than 10% of the thickness may be removed.
6. Patches shall be round or oval in shape, made of the same liner and extend a minimum of 6 inches beyond the edge of defects. The top edge shall be beveled prior to placement.
7. Re-seaming over an existing seam without regrinding shall not be permitted.

I. Verification of Repairs.

1. Each repair shall be non-destructively tested.
2. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair.
3. Failed tests indicate that the repair shall be repeated and retested until passing results are achieved.
4. Daily documentation of testing shall be provided to the representative approved by the OWNER and shall identify all seams that initially failed the test and include evidence that these seams were repaired and successfully retested.

3.05 SCHEDULE

- A. Single layer 60 mil HDPE liner as indicated on Drawings.

PART 4 PAYMENT

Costs for the work in this Section shall be included on the bid item identified as “High Density HDPE

Liner, 60 mil, to include all Penetration Seals, Anchor Trenches, concrete, temporary removal and replacement of existing conduits, subgrade prep, compaction and installation, CIP.” This bid item will be paid on a Square Foot basis.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

- A. The extent of formwork is indicated by the cast-in-place concrete structures shown on the Drawings.
- B. The Work includes providing formwork, and shoring, for cast-in-place concrete and installation into formwork of items furnished by others, such as anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings, and other items to be embedded in concrete (but not including reinforcing steel).
- C. Related Work:
 - 1. Section 03200: Concrete Reinforcement
 - 2. Section 03300: Cast-In-Place Concrete

1.02 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117, Specifications for Tolerances for Concrete Construction and Materials
 - 2. ACI 301, Specifications for Structural Concrete
 - 3. ACI 315, Detail and Detailing of Concrete Reinforcement
 - 4. ACI 318, Building Code Requirements for Structural Concrete
 - 5. ACI 347R, Guide to Formwork for Concrete
- B. Concrete Reinforcing Steel Institute, CRSI Manual of Standard Practice
- C. American Society for Testing Materials (ASTM)
 - 1. ASTM C203, Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation

2. ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics
3. ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

1.03 SUBMITTALS

- A. Submit in accordance with Division 1 requirements.
- B. Product Data; Concrete Formwork: submit 1 digital copy of manufacturer's data and installation instructions for proprietary materials including form coatings manufactured form systems, ties, accessories, and other items specified herein.

1.04 QUALITY ASSURANCE

- A. The Installer must examine the substrate and the conditions under which concrete formwork is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Codes and Standards: Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347R, "Guide to Formwork for Concrete."
- C. Allowable Tolerances:
 1. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347R and as follows:
 - a. Variation from plumb in lines and surfaces of columns, piers, walls, and arrises; 1/4 inch per 10 feet, but not more than one inch. For exposed corner columns, control joint grooves, and other conspicuous lines, 1/4 inch in a bay or 20 feet maximum; 1/2" maximum in 40 ft. or more.
 - b. Variation in sizes and locations of sleeves, floor openings, and wall openings, 1/4 inch.
 - c. Variations in footings plan dimensions, minus 1/2 inch and plus 2 inches; misplacement or eccentricity, 2 percent of the footing width in direction of misplacement but not more than 2 inches; thickness reduction, minus 5 percent.

2. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and locations of concrete members and stability of forming systems.
3. During concrete placement, check formwork and related supports to ensure that forms are not displaced, and that completed Work will be within specified tolerances.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete

1. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed, plywood-faced, or other panel type materials acceptable to Architect, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practicable sizes to minimize number of joints to conform to joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
 - a. Plywood: APA grade-trademarked "B-B Plyform Exterior," mill oiled.

B. Forms for Unexposed Finish Concrete

1. Form concrete surfaces which will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and one side for tight fit.

C. Form Units

1. Provide factory-fabricated, adjustable-length, removable, or snap-off metal form ties; design to prevent form deflection and to prevent spalling concrete surfaces upon removal.
2. Unless otherwise shown, provide ties so that the portion remaining within concrete after removal of exterior parts is at least one inch from outer concrete surface. Unless otherwise indicated, provide form ties which will leave a hole not larger than one-inch diameter in concrete surfaces.
3. Form ties fabricated on the project site and wire ties are not acceptable.

D. Form Coatings

1. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

E. Inserts

1. Provide metal inserts for anchorage of materials or equipment to concrete construction not supplied by other trades and as required for the Work.
2. Provide Fry original reglet as manufactured by Fry Reglet Corporation, Alhambra, California. Reglet shall be made of .050 polyvinylchloride, meeting ASTM Spec. D-1874. Provide steel spacer channel for positive alignment and barrier to grout.
3. Vinyl Chamfer Strips: Shall be Vinylex CSN-3/4 as manufactured by Vinylex Corporation, Knoxville, Tennessee.

2.02 DESIGN OF FORMWORK

- A. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork and construction tolerances and surface irregularities complying with the following ACI 347 limits:
 1. Provide Class A tolerances for concrete surfaces exposed to view.
 2. Provide Class C tolerances for other concrete surfaces.
- B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- C. Construct forms to sizes, shapes, and lines, and dimensions shown to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes.

Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

- D. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses and the like for easy removal.
- E. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joint and provide backup material at joints as required to prevent leakage and fins.
- F. Provide temporary openings for cleanouts and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exposed corners and edges as indicated using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- I. Provisions for other Trades: Coordinate openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Formwork design and fabrication as well as its construction are the responsibility of the CONTRACTOR.
- B. Formwork shall be used to confine the concrete and to shape it to the required shapes, lines and dimensions.

- C. Formwork shall have sufficient strength to resist the loads which result from the placing and vibration of concrete and shall have sufficient rigidity to maintain the dimensions of the concrete within the specified tolerances.
- D. Except at inside faces of turned-down slabs, earth cuts shall not be used as forms for vertical surfaces without approval of the ENGINEER.

3.02 FORM CONSTRUCTION

- A. Construct forms complying with ACI 347R to the exact sizes, shapes, lines, and plumb work in finish structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.
 - 1. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.
- D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
- E. Falsework:
 - 1. Erect falsework and support, brace and maintain it to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.

2. Provide wedges, jacks, or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of required dimensions.
3. Support form facing materials by members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.
4. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads for long span members without intermediate supports.
5. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of required dimension.

F. Forms for Exposed Concrete

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Do not use metal cover plates for patching holes or defects in forms.
3. Provide sharp, clean corners at intersecting planes without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
4. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
5. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
6. Form molding shapes, recesses, and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.

G. Corner Treatment

1. Form chamfers with 3/4-inch x 3/4-inch strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
2. Unexposed corners may be formed either square or chamfered.

H. Provision for Other Trades

1. Provide openings in concrete formwork to accommodate work of other trades including those under separate prime contracts. Size and location of openings, recesses, and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into form.

I. Cleaning and Tightening

1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

J. Construction Joints

1. Where footings and walls are divided by construction joints, joints shall have keyways formed. Keyways shall be 1/3 of the dimension of the element in both directions and shall be at least 2 inches thick.

3.03 FORM COATINGS

- A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.
- B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.04 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into the Work anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

- B. Edge Forms and Screed Strips for Slabs: Set edge form or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required.
 - 1. Forms for concrete curbs and bases shall be rigidly held straight and tight so that finished concrete will be level and even.

3.05 REMOVAL OF FORMS

- A. Formwork may be removed at the minimum time listed, provided the concrete is sufficiently hard to not be damaged by form removal operation; and provided that curing and protection operations are maintained.
 - 1. Side forms for footings: 24 hours
 - 2. Side forms for walls, columns and beams: 48 hours.
 - 3. Soffit forms for beams and slabs: When concrete has reached not less than 100% of its specified 28-day strength and subject to approval by the ENGINEER.
- B. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.
- C. Remove formwork without prying against concrete. Repair all surface defects as specified in Section 03300: Cast-in-place Concrete.

3.06 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

END OF SECTION

SECTION 03150

MECHANICAL PIPE SEALS AND SLEEVES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Mechanical pipe seals and sleeves for pipe penetrations through concrete walls and floors.

1.02 RELATED WORK

- A. Section 03300: Cast-in-Place Concrete

1.03 REFERENCES

- A. Section 01600 Product Requirements.
- B. ASTM and ANSI Standards as indicated in Part 2 of this Section.

1.04 SUBMITTALS

- A. Supplemental Conditions of the contract: American Iron and Steel Certifications
- B. Contractor Submittals: Section 01300
- C. Manufacturer's installation recommendations

1.05 QUALITY ASSURANCE

- A. Modular seals shall be domestically manufactured at a plant with a current ISO-9001:2000 registration.

1.06 WARRANTY

- A. The manufacturer shall warrant the sleeve and seal material furnished to be free from defect in material or workmanship for one year.

PART 2 PRODUCTS

Mechanical Pipe Seals and Sleeves
Aztec Reservoir #1 Improvements

2.01 MANUFACTURERS

- A. PSI-Thunderline/ Link-Seal® Modular Seal, Century-Line® Sleeve, Cell-Cast® Hole Forming Discs as manufactured by Pipeline Seal & Insulator, Inc, Houston, TX
- B. ENGINEER approved equal

2.02 MATERIALS

- A. Modular seal elements shall have the following properties:

PROPERTY	ASTM METHOD	EPDM (EPDM L)	NITRILE	SILICONE
Hardness (shore A)	D-2240	50 ±5 (40 ±5)	50 ±5	50 ±5
Tensile	D-412	1450 psi	1300 psi	860 psi
Elongation	D-412	400%	300%	250%
Compression Set	S-395	15% 22 hrs. @ 158°F (70°C)	45% 22 hrs. @ 212°F (100°C)	40% 22 hrs. @ 350°F (177°C)
Specific Gravity	D-297	1.10	1.15	1.40

- B. Composite pressure plates shall have the following properties:

PROPERTY	ASTM METHOD	VALUE
Izod Impact - Notched	D-256	2.05 ft-lb/in
Tensile Strength @ Yield	D-638	20,000 psi
Tensile Strength - Break	D-638	20,250 psi
Flexural Strength @ Yield	D-790	30,750 psi
Flexural Modulus	D-790	1,124,000 psi
Elongation, Break	D-638	11.07%
Specific Gravity	D-792	1.38

- C. Bolt and nuts shall have the following properties:

1. Carbon Steel: 60,000 psi minimum tensile strength and 2-part Zinc Dichromate coating per ASTM B-633 and Organic Coating, tested in accordance with ASTM B-117 to pass a 1,500-hour salt spray test.
2. Stainless Steel: ANSI Type 316 per ASTM F593, 85,000 psi tensile strength.

2.03 PENETRATION SEALS

Mechanical Pipe Seals and Sleeves
Aztec Reservoir #1 Improvements

- A. Modular, mechanical seal, consisting of rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
- B. Pressure plates shall be molded of glass reinforced nylon.
- C. Hardware shall be carbon steel or 316 stainless steel as scheduled and shown on the drawings.
- D. Coloration shall be throughout elastomer for positive field inspection.
- E. Each link shall have permanent identification of the size and manufacturer's name molded into the pressure plate and sealing element.

2.04 SLEEVES AND WALL OPENINGS

- A. For diameters up to 24.81": Install molded non-metallic high density polyethylene sleeves (HDPE) with integral hollow, molded water-stop ring four inches larger than the outside diameter of the sleeve itself with end caps manufactured of the same material as the sleeve itself and installed at each end of the sleeve so as to prevent deformation during the initial concrete pour and to facilitate attaching the sleeve to the wall forms.
- B. For openings from 29.25" to 64.74" in diameter, use a modular hole-forming system consisting of interlocking HDPE plastic discs, or blockout to appropriate diameter.

PART 3 EXECUTION

3.01 PROTECTION, PREPARATION AND INSTALLATION

- A. In accordance with Manufacturer's recommendations.

3.02 SCHEDULE

- A. Stainless steel bolts and nuts
- B. Pipe seal and sleeve sizes as shown on the Drawings.

END OF SECTION

SECTION 03151

ANCHOR BOLTS AND CHEMICAL ANCHORS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install equipment anchor bolts, structural anchor bolts, and chemical anchors, complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Section 01300: Contractor Submittals
- B. Section 01600: Product Requirements
- C. Section 03300: Cast-In-Place Concrete
- D. Division 11 equipment specifications

1.03 SUBMITTALS

- A. Supplemental Conditions of the contract: American Iron and Steel Certifications
- B. Product Data: shall be submitted to the Engineer in accordance with Section 01300.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bolts:
 - 1. Carbon steel: ASTM F1554.
 - 2. Galvanized steel:
 - a. Carbon steel, hot-dip galvanized, ASTM A153.
 - b. Zinc plates, ASTM A164 type GS.
 - 3. Stainless steel where scheduled.

- B. Nuts:
 - 1. Same material as bolts.
 - 2. Carbon steel: ASTM A563, Grade B, heavy, hexagonal.
 - 3. Self-locking: prevailing torque, IFI-100, Grade A.
- C. Washers:
 - 1. Same material as bolts.
 - 2. Flat: ANSI B27.2.
 - 3. Locking: spring-type, ANSI B27.1.
- D. Sleeves:
 - 1. Pipe: ASTM A120, galvanized.
 - 2. Bearing plates: ASTM A36, galvanized.
- E. Chemical Anchors
 - 1. Fastener or connector: Bolt, threaded rod or deformed rod as shown on Drawings, material as indicated.
 - 2. Screen Sleeves: For attachment to hollow masonry walls, provide stainless steel screen sleeves specifically manufactured for the purpose and approved by the manufacturer of the adhesive to be used.
 - 3. Chemical adhesive: Two component system to be mixed at the site and placed into predrilled holes.
 - 4. Acceptable products: Subject to compliance with the requirements of these specifications:
 - a. HIT HY 200, OR HIT-RE 500V3 (Hilti) or as shown on the drawings
 - b. Engineering approved equivalent

PART 3 EXECUTION

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver anchor bolts and templates in time to permit setting when structural concrete is placed.

Anchor Bolts and Chemical Anchors
Aztec Reservoir #1 Improvements

3.02 FABRICATION AND MANUFACTURE

A. Anchor Bolts:

1. $\frac{3}{4}$ " minimum, except as indicated on the Drawings.
2. Type:
 - a. General use: hex headed.
 - b. Where indicated on Drawings or specified:
 - i. Straight bolt with square head.
 - ii. Straight bolt with square plate welded to bolt and nut welded to plate and bolt.
 - iii. Through bolt with sleeve and square plate assembly.
 - iv. Coupled bolt with sleeve welded to square plate and bolt.

3.03 INSPECTION

- A. Verify that holes for anchor bolts in forms and templates match applicable equipment Shop Drawings.

3.04 INSTALLATION

A. Anchor Bolts:

1. Where installed in cast-in-place concrete prior to concrete placement, install a nut on the concrete side of the form or supporting template.
2. Provide:
 - a. Three nuts for each anchor bolt for which a lock nut is indicated.
 - b. Two for others.
3. Sleeved anchor bolts:
 - a. Centered in pipe sleeve.
 - b. Sleeve ID: approximately $2\frac{1}{2}$ x bolt OD.
 - c. Sleeve length: approximately 8 x bolt OD.
 - d. Bearing plate minimum thickness: $\frac{1}{2}$ x bolt OD.

4. Through bolts:
 - a. Sleeved with bearing plates.
 - b. Bearing plates welded to bolt and plate welded to sleeve.
 - c. Dimension: as specified for sleeved anchor bolts.

B. Chemical Anchors:

1. Install in conformity with the manufacturer's instructions.

3.05 SCHEDULE

- A. Anchor bolts to be stainless steel unless noted otherwise.
- B. All sleeves and plates to be hot dipped galvanized unless noted otherwise.
- C. All anchor bolts to be pre-placed or chemical anchors if installed after concrete placement unless noted otherwise.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. The extent of concrete reinforcement is shown on the Drawings and in schedules.
- B. The Work includes fabrication and placement of reinforcement for cast-in-place concrete including bars, welded wire fabric, ties, and supports.
- C. Related Work:
 - 1. Section 03100: Concrete Formwork
 - 2. Section 03300: Cast-In-Place Concrete

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A185 – Steel Welded Steel Reinforcement, Plain, for Concrete
 - 2. ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 3. ASTM A706 – Deformed and Plain Low-Alloy Steel Bars for concrete Reinforcement
 - 4. ASTM A1064 – Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- B. American Concrete Institute (ACI):
 - 1. ACI 301 - Specifications for Structural Concrete
 - 2. ACI 315 - Guide to Presenting Reinforcing Steel Design Details
 - 3. ACI 318 - Building Code Requirements for Structural Concrete
- C. Concrete Reinforcing Steel Institute (CRSI):
 - 1. Manual of Standard Practice
 - 2. CRSI 63 - Recommended Practice for Placing Reinforcing Bars

3. CRSI 65 - Recommended Practice for Placing Bar Supports Specifications, and Nomenclature.

1.03 SUBMITTALS

- A. Submit in accordance with Division 1 requirements.
- B. Product Data.
 1. Submit 1 electronic copy of manufacturer's specifications and installation instructions for proprietary materials and reinforcement accessories.
 - a. Reinforcing chairs
 - b. Mill test certificates
- C. Shop Drawings
 1. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315- Latest Edition "Guide to Presenting Reinforcing Steel Design Details." Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements, and assemblies as required for the fabrication and placement of concrete reinforcement. Show building plans with bar sizes, spacing, and quantities for all bent and straight reinforcing bars. Show wall reinforcing steel in elevation.
- D. Supplemental Conditions of the contract: American Iron and Steel Certifications

1.04 QUALITY ASSURANCE

- A. The Installer must examine the substrate and the conditions under which concrete reinforcement is to be placed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Codes and Standards: Comply with requirements of the latest edition of the following codes and standards, except as herein modified:
 1. American Welding Society, AWS D1.1 and D1.4
 2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
 3. American Concrete Institute, ACI 318-11 "Building Code Requirements for Structural Concrete."

1.05 DELIVERY, HANDLING, AND STORAGE

- A. Deliver reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Reinforcing Bars (Rebar, ReBar): ASTM A615, and ASTM A706 and as follows.
 - 1. Provide Grade 60 for bars No. 3 to 11, except as otherwise indicated.
- B. Steel Wire: ASTM A1064.
- C. Supports for Reinforcement (including welded wire fabric): Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place.
 - 1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
 - 2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 3. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane.
 - 4. For footings, trench footings, and grade beams use precast concrete bricks ($f_c = 3000$ psi min. at 28 days). (Concrete masonry bricks not acceptable).
 - 5. For concrete masonry bond beams use #2 bar laterally, tied to each longitudinal reinforcing bar below to hold bars apart and up from bottom. Space #2 bars at 48 inches on center.

2.02 FABRICATION

- A. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice." In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material. Do not weld reinforcing bars without specific prior approval of the ENGINEER.

- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work.
 - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on Drawings or final shop drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 EXECUTION

3.01 EXAMINATION

- A. The installer must examine the conditions under which concrete reinforcement is to be placed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. The Engineer shall be notified by the Contractor when steel placement for a concrete pour is nearing a completion so that the Work may be observed.

3.02 INSTALLATION

- A. Comply with the specified codes and standards and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement by formwork construction, or concrete placement operations. Locate and support reinforcing by precast concrete brick, metal chairs, runners, bolsters, spacers, and hangers as required.
- D. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16-gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16-gauge wire. Do not make end laps midway between supporting beams or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

- F. Provide sufficient numbers of supports and of strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runaways for concrete conveying equipment and similar construction loads.
- G. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tightly tying wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.
- H. Reinforcing steel installed in continuous footings shall run continuous. This shall include specially shaped components with proper lap where corner reinforcing and step footings occur.
- I. Locate reinforcement and other items to avoid conflict with the work of other trades. Provide additional reinforcement around openings as shown. Do not cut or remove reinforcement for any reason without the prior approval of the ENGINEER. Provide additional reinforcing around required openings in footings, and slabs having at least a one-foot dimension.
- J. Continuity of Vertical Reinforcement. No splices are permitted except as shown. Provide dowels from footings to walls or columns at all vertical bars in walls or columns. Except as otherwise shown, dowels shall have standard 90 degree ACI hooks with 12 inch horizontal extensions and vertical legs of sufficient length to provide ACI Class B tension lap splices with the vertical bars.
- K. Continuity of Horizontal Reinforcement.
 - 1. Footings, walls, turned-down slab edges; Bars shall be lapped not less than 32 bar diameters or 24 inches except where larger splice lengths are shown or required to create a Class B lap splice per ACI 318. Except where bar lengths are given, reinforcement is to be continuous for full length or width of member less required concrete covers. Do not splice transverse footing bars. Additional reinforcement shall be provided at corners, intersections and other discontinuities as shown on the drawings.
 - 2. Concrete slabs-on-grade: Welded wire fabric shall be lapped not less than one-and-one-half meshes or 8 inches on all sides.
 - 3. Elevated slabs, beams: No splices except as shown.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, equipment and materials necessary for Cast in Place Concrete Work as shown on the Drawings and specified in this Division of these Specifications including all miscellaneous labor, equipment and materials not specifically shown or specified but which are required for a complete installation.

1.02 RELATED WORK

- A. Section 03100: Concrete Formwork
- B. Section 03150: Mechanical Pipe Sleeves and Seals
- C. Section 03151: Anchor Bolts and Chemical Anchors
- D. Section 03200: Concrete Reinforcement

1.03 REFERENCES

- A. General: The publications, manuals, standard specifications and codes listed below are a part of these specifications, the same as if fully set forth herein. If two or more of these documents are in conflict, the more restrictive shall govern except as otherwise shown on the design drawings or as given herein. Except as specifically indicated otherwise, the most recent revision or edition of each document shall be used.
- B. American Concrete Institute (ACI):
 - 1. ACI 301 Specifications for Structural Concrete for Buildings.
 - 2. ACI 309 Standard Practice for Consolidation of Concrete.
 - 3. ACI 318 Building Code Requirements for Reinforced Concrete.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM C31 Making and Curing Concrete Test Specimens in the Field.
 - 2. ASTM C33 Concrete Aggregates.
 - 3. ASTM C39 Compressive Strength of Cylindrical Concrete Specimens.
 - 4. ASTM C42 Drilled Cores and Sawed Beams of Concrete.

5. ASTM C94 Ready Mixed Concrete.
6. ASTM C143 Slump of Portland Cement Concrete.
7. ASTM C150 Portland Cement.
8. ASTM C172 Sampling Fresh Concrete.
9. ASTM C192 Making and Curing Concrete Test Specimens in the Laboratory.
10. ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method.
11. ASTM C260 Air Entraining Admixtures for Concrete.
12. ASTM C309 Liquid Membrane Forming Compounds for Curing Concrete.
13. ASTM C494 Chemical Admixtures for Concrete.
14. ASTM C618 Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
15. ASTM C881 Epoxy Resin Base Bonding System for Concrete.
16. ASTM D1751 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

1.04 SUBMITTALS

- A. Submit product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and other specified items.
- B. Submit laboratory test reports for concrete materials and mix design tests.
- C. Submit material certificates in lieu of material laboratory test reports when permitted by ENGINEER. Material certificates shall be signed by manufacturer and CONTRACTOR, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- D. Submit proposed mix designs with the following information where applicable:
 1. Minimum specified compressive strength of the concrete.
 2. Maximum water-cement ratio

3. Nominal maximum size of coarse aggregate.
 4. Air content
 5. Admixtures
 6. Maximum percentage of pozzolans
 7. Historical concrete mix data per ACI 301 or an alternative ACI approved method.
 - a. Data not older than 24 months
 - b. Data based on field test records or laboratory trial batches.
- E. Submit statement from ready-mixed plant verifying conformance to specifications and proposed mix designs.
- F. Submit concrete curing materials product data and specification sheets.

1.05 ADDITIONAL REQUIREMENTS

- A. Division 1 Sections of these Specifications

1.06 QUALITY ASSURANCE

- A. Refer to Division 1 for additional requirements.
- B. Materials may require testing and re-testing, as directed by the ENGINEER, at any time during the progress of the Work. Allow free access to material stockpiles and facilities.
- C. Concrete curing materials shall be approved by the manufacturer of the product for the final finish material on the concrete slabs. Submit written approval/certification if requested by the ENGINEER.

1.07 PROJECT CONDITIONS

- A. Trades requiring inserts and sleeves for their work shall furnish same for installation as Work under this Section. Delivery of inserts and sleeves for installation as Work under this Section shall be timed so as not to cause delay in the progress of this Work.

- B. Installation requirements within this Specification Section are not intended to be restrictive and the CONTRACTOR is allowed when reviewed with the ENGINEER 's field representative to adjust the means and methods used to meet required tolerances. Compliance with required tolerances is the responsibility of the CONTRACTOR and adjustment required to meet these shall not be unduly restricted by the ENGINEER or his representative.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type V or Type I-II modified cement for sulfate resistance.
 - 1. Use one brand of cement throughout Project.
- B. Aggregates:
 - 1. General: Strong, durable, well graded minerals conforming to ASTM C33.
 - 2. Coarse aggregate maximum size is 3/4 inches.
 - 3. Maximum coarse aggregate size shall also be subject to the following limitations:
 - a. 1/5 the narrowest dimension between the sides of the forms.
 - b. 1/3 the depth of slab
 - c. 3/4 the minimum clear spacing between individual reinforcing bars or wires, or bundles of bars.
 - 4. Alkali-Silica Reactivity: The CONTRACTOR shall use aggregates that are not Alkali-Silica Reactive (ASR). Documentation shall be submitted for review certifying that aggregates are not potentially or known to be reactive.
- C. Water: Clean, potable, free from injurious amounts of oil, alkali, acid, salts, organic materials or other substances that may be deleterious to concrete or steel.
- D. Fly Ash:
 - 1. ASTM C618
 - 2. The CONTRACTOR shall use Class F fly ash if either the coarse or the fine aggregate is reactive. If both the coarse and the fine aggregates are non-reactive, then the CONTRACTOR may choose to use the Class C fly ash.

2.02 CONCRETE ADMIXTURES

- A. Provide admixtures produced by established reputable manufacturers and use in compliance with manufacturer's printed directions. Do not use admixtures which have not been incorporated and tested in accepted mixes, unless otherwise authorized specifically in writing by ENGINEER.
- B. Water-reducing and setting time modifying admixture: ASTM C 494.
 - 1. Design mix submittals shall include these admixtures and shall indicate for which types of concrete structures they are to be used.
- C. Producing flowing concrete: ASTM C1017
- D. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures. Use air-entraining admixture in exterior concrete, unless otherwise indicated. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:
 - a. 3 to 15 percent for maximum 2 inches aggregate.
 - b. 4-1/2 percent to 6-1/2 percent for maximum 1-inch aggregate.
 - c. 5 to 7 percent for maximum 3/4-inch aggregate.
 - d. 6 to 8 percent for maximum 1/2-inch aggregate.
 - 2. Other Exterior Concrete: 2 to 4 percent
- E. Inhibiting chloride-induced corrosion: ASTM C1582.
- F. Prohibited Admixtures: Calcium chloride or admixtures containing more than 0.05 percent chloride ions are not permitted.
- G. Use amount of admixtures recommended by manufacturer for climatic conditions prevailing at time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

2.03 CONCRETE CLASSES AND MIX DESIGNS

- A. Strength classifications:

<u>Class</u>	<u>Cement Type</u>	<u>Fly Ash</u>	<u>Required Compressive Strength, f_c</u>
A	II	Class F	4,000 psi
B	I - II	Class C or F In accordance w/ 2.01, Part D	4,000 psi
C	I - II	Class C or F In accordance w/ 2.01, Part D	3,000 psi

- B. Required compressive strength: Average strength which each pair of laboratory cured cylinders tested at 28 days must achieve.
- C. Maximum water cement ratio: 0.50 for Class A concrete; 0.55 otherwise.
- D. Cementitious Material:
1. Minimum cementitious material content: 658 pounds per cubic yard (7.0 sacks per yard) in Class A concrete, 564 pounds per cubic yard (6.0 sacks per yard) otherwise.
 2. For Class A concrete, substitute 30% by weight of cement with Class F fly ash
 3. For Class B and C concrete, up to 30% by weight of cement may be replaced with Class C or F fly ash in accordance with Section 2.01, Part D.
- E. Entrained Air Content: 3% to 6% by volume.
- F. Workability:
1. Proportions of the concrete shall produce a mixture, suited to placement methods, which will work readily into corners and angles of forms and around reinforcement and embedded items. Segregation of materials or free water will not be permitted.
 2. Slump of concrete: 4" maximum.
- G. Concrete Use:
1. Class A concrete: All structures in which concrete comes into contact with sewage (treated or untreated) or sludge.
 2. Class B concrete: Interior concrete slabs on grade, exterior flatwork.
 3. Class C concrete: All concrete except as otherwise specified.

2.04 READY MIX CONCRETE

- A. Use unless otherwise approved by the ENGINEER.
- B. Conform to ASTM C94, Alternative No. 3, and the requirements of these Specifications.

2.05 WATERSTOPS

- A. Provide centerbulb type waterstops at expansion joints as indicated. Fabricate waterstops from all new synthetic rubber to conform to Corps of Engineers CAD C 513. Provide sizes as shown with prefabricated fittings to match at corners and intersections.
- B. Provide PVC or hydrophilic type waterstops at construction joints as indicated. Provide sizes to match at corners and intersections.
- C. Manufacturers offering products which may be incorporated in the Work include but are not limited to:
 - 1. The Burke Company
 - 2. Progress Unlimited
 - 3. Williams Products Incorporated
 - 4. Greenstreak Group

2.06 EXPANSION JOINT FILLER

- A. Preformed nonextruding and resilient bituminous types, ASTM D1751. Must be compatible with joint sealer specified.

2.07 EMBEDDED ITEMS

- A. Conduit or pipe embedded in concrete:
 - 1. Approval: Do not embed any items in concrete members without the prior approval of the ENGINEER except those items specifically shown on the Structural drawings or specified in this Section.
 - 2. Material:
 - a. General Use: Uncoated or galvanized steel clean and free from rust. Wall thickness not less than standard weight pipe.
 - b. Electrical conduit: Rigid non-metallic conduit conforming to requirements of Division 16 of these Specifications.
 - 3. Size: Maximum outside diameter of conduit or pipe shall not exceed 1/4 of the thickness of the concrete member unless otherwise shown.

- B. Dovetail anchor slots:
 - 1. Type: 22 gage steel, galvanized. Coordinate shape with shape of dovetail anchors specified in Division 4 sections.
 - 2. Use: Fasten masonry to cast in place concrete.

2.08 NON-SHRINK GROUT

- A. General: Conform to requirements of Corps of Engineers CAD C 621.
- B. Use: For grouping column baseplate, equipment mounted on concrete foundations and elsewhere as shown or specified. Grout for use in Masonry work is specified in Division 4 sections.
- C. Expansion: Submit manufacturer's certification and test results that proposed material is expansive at water contents proposed for use.
- D. Grout thickness: 2" unless shown otherwise.
- E. Acceptable products:
 - 1. Five Star Products, Inc.
 - 2. "Masterflow 928 Grout" by Master Builders.
 - 3. "Crystex" by L & M Construction Chemicals, Inc.
 - 4. "Supreme Grout" by Gifford Hill Company.
 - 5. "Non Ferrous, Non Shrink Grout" by the Bark Company.
 - 6. Non-shrink, non-ferrous, non-gaseous precision grout, Sealtight by Meadows.
- F. Minimum compressive strength: 5,000 psi at 3 days when installed by the damp pack method.

2.09 EPOXY GROUT

- A. Two component material conforming to ASTM C881 and suitable for use on dry or damp surfaces. Provide material of type class and grade as required to suit project requirements.
- B. Subject to compliance with requirements, products which may be incorporated into the work include, but are not limited to the following:
 - 1. Five Star Product, Inc.

2. "Sikadur Hi Mod", Sikh Chemical Corporation.
3. "Concresive 1440, 1441 and 1442", Adhesive Engineering Company.
4. "Patch and Bond Epoxy", The Bark Company.
5. Rezi-weld 1000, Sealtight, by Meadows.

2.10 BONDING AGENT

- A. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application complying with MIL-B-19235.

2.11 CONCRETE CURING MATERIALS

- A. Concrete Floor Hardener
 1. Non metallic shake on mineral aggregate surface hardener.
 2. Acceptable products include but are not limited to:
 - a. "Mastercron" by Master Builders, Incorporated.
 - b. "Quartz Plate" by L&M Construction Chemicals, Incorporated.
 - c. "Non Metallic Floor Hardener" by The Burke Company.
- B. Moisture-Retaining Cover: One of the following, complying with ANSI-ASTM C171 for concrete floors that are to be exposed or to receive floor sealer. CONTRACTOR's option to obtain specified requirements for concrete slabs-on-grade. Coordinate uses with finish material manufacturer's specifications.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- D. Water Based Acrylic Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class B, with 18 to 20 percent minimum solids.
- E. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- F. Concrete curing materials shall be approved by the manufacturer of the product for the final finish on the concrete slabs. Submit written approval/certification.

PART 3 EXECUTION

3.01 PREPARATION

- A. Inspect and verify that conditions are satisfactory before beginning the work. Do not begin work until all unsatisfactory conditions are corrected. Beginning of work indicates acceptance of conditions.
- B. Construct and install formwork in accordance with the requirements of Section 03100 Concrete Formwork of these specifications. Verify that formwork has sufficient strength and rigidity to shape and contain concrete to the configurations shown within the tolerances specified below. Treat surfaces of concrete with form release agent as specified in Section 03100.
- C. Install reinforcement, anchors, bearing seats and all other embedded items to be cast in concrete are accurately located and held securely in place as required to prevent displacement during concrete placement operations. See Section 03200: Concrete Reinforcement. See below for requirements for concrete protection for reinforcement.
- D. Coordinate work with other trades to ensure that all blackouts, penetrations and embedded items required for the work of other trades are correctly sized, located and secured in position. Provide additional reinforcement at blackouts and penetrations as shown. Do not embed any items in concrete except those shown on the Structural drawings without prior approval of the ENGINEER. Do not embed any aluminum items in concrete without prior approval of the ENGINEER.

3.02 TOLERANCES FOR FORMED CONCRETE SURFACES

- A. Variation from plumb:
 - 1. In lines and surfaces of columns, piers, walls and artists:
 - a. In any 10 feet of length: 1/4 inch
 - b. Maximum for the entire length: 1 inch
 - 2. For exposed corner columns, control-joint grooves, and other conspicuous lines:
 - a. In any 20 foot length: 1/4 inch
 - b. Maximum for the entire length: 1/2 inch
- B. Variation from level or from the grades shown or specified:

1. In slab and beam soffits, ceilings, arises, measured before removal of supporting shores unless otherwise noted:
 - a. In any 10 feet of length: 1/4 inch
 - b. In any bay or any 20-foot length: 3/8 inch
 - c. Maximum for the entire length: 3/4 inch
 2. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
 - a. In any bay or in 20 foot length: 1/4 inch
 - b. Maximum for the entire length: 1/2 inch
- C. Variation of linear building lines from position established in plan and related position of columns, walls and partitions:
1. In any bay or 20 feet of length: 1/2 inch
 2. Maximum for the entire length: 1 inch
- D. Variation in the sizes and locations of sleeves, floor openings and wall
1. Openings: $\pm 1/4$ inch
- E. Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: 1/4 inch, +1/2 inch
- F. Footings:
1. Variations from dimensions in plan: 1/2", +2 inches
 2. Misplacement or eccentricity: 2 percent of the footing width in the direction of misplacement but not more than 2 inches
 3. Thickness:
 - a. Decrease in specified thickness: 5 percent
 - b. Increased in specified thickness: No Limit
 - c. Maximum decrease for the entire length: 3/4 inch
- G. Variation in steps:
1. In a flight of stairs:
 - a. Rise: $\pm 1/8$ inch

- b. Tread: $\pm 1/4$ inch
- 2. In consecutive steps:
 - a. Rise: $\pm 1/16$ inch
 - b. Tread: $\pm 1/8$ inch

3.03 TOLERANCES ON POSITION OF REINFORCEMENT

- A. Variation in position of longitudinal bars in beams, slabs, walls and Columns: $\pm 3/8$ inch
- B. Variation in position in longitudinal direction for bends and ends of reinforcement:
 - 1. Typical: ± 2 inches
 - 2. At discontinuous ends of members: $\pm 1/2$ inch

3.04 CONCRETE PROTECTION FOR REINFORCEMENT

- A. Concrete cast against and permanently exposed to earth: 3 inches
- B. Concrete cast in forms but exposed to liquids, earth or weather in service:
 - 1. Beam stirrups, column ties: 2 inches
 - 2. Main (longitudinal) reinforcement: 2 1/2 inches
- C. Concrete cast in forms but not exposed to liquids, earth or weather in service:
 - 1. Walls, slabs, joists: 1 inch
 - 2. Beam stirrups, column ties: 1 1/2 inches
 - 3. Main (longitudinal) reinforcement in beams and columns: 2 inches
- D. Tolerance on concrete cover is 3/8 inch for all cases.

3.05 INSTALLING EMBEDDED ITEMS

- A. Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.06 CONSTRUCTION JOINTS

- A. Install only where shown unless prior approval is obtained from ENGINEER for any relocation.
- B. Provide keyway 1 1/2" deep covering approximately 1/3 area of construction joint, unless shown otherwise.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Roughened surface: Chip or sandblast surface to full amplitude of 1/4"; surface shall be clean and free of all latency and loose concrete.
 - 1. Use in place of keyway where roughened surface is indicated on Drawings.
 - 2. Use on surfaces to receive grout.
- F. Location where not shown: See General Notes Concrete Construction on Drawings.
- G. Allow at least four hours to pass after placing concrete for columns or walls before placing concrete for slabs, beams, or girders supported thereon.

3.07 INSTALLATION OF EXPANSION JOINT FILLER

- A. Install materials in accordance with manufacturer's written directions. Set preformed material securely in place before placing concrete.
- B. Install joint filler to within 1/2" of exposed surface. Fill remainder of joint with joint sealer.

3.08 INSTALLATION OF NON-SHRINK GROUT

- A. Preparation for placing:

1. Roughen surface below bearing area with pneumatic tools.
 2. Thoroughly clean roughened surface of concrete foundations and soak surface with water for 24 hours prior to grouping.
- B. Placing:
1. Place and cure nonshrink grout in strict accordance with manufacturer's printed instructions.
 2. Grout must be free of bleeding at recommended water content.
 3. Temperature of concrete foundations and baseplate at time of placing grout shall be within limits recommended by grout manufacturer.
- C. Grout under base plates to provide full bearing area after steel or equipment has been properly positioned and secured.

3.09 INSTALLATION OF EPOXY GROUT

- A. Verify field conditions before beginning installation of epoxy grout. Do not begin work until all unsatisfactory conditions have been corrected.
- B. Prepare surfaces or drill holes to receive epoxy grout as shown on the Drawings and in accordance with the epoxy manufacturer's written instruction.
- C. Mix epoxy components in accordance with manufacturer's written directions in clean equipment and containers.
- D. Conform to pot life and workability limits set by epoxy manufacturer.

3.10 PREPARING FORM SURFACES

- A. Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.11 CONCRETE PLACEMENT

- A. Clean transporting equipment, reinforcing, and embedded items before placing concrete. Remove water and debris from places to be occupied by concrete.

- B. Place no concrete until forms, reinforcing, and embedded items have been observed by ENGINEER. Place no concrete over water covered or muddy soil.
- C. Dampen subgrade and forms.
- D. Apply bonding agent of specified type in strict accordance with manufacturer's instructions to hardened concrete where new concrete is to be placed against hardened concrete.
- E. Where conditions make placement or consolidation difficult or where reinforcements congested, concrete using an approved high range water reducing agent ("superplasticizer") shall be used.
- F. Employ best industry practices to prevent segregation during placing. Do not permit free falls of concrete greater than 5 feet.
- G. Place concrete continuously in each section until completed. Permit not more than 30 minutes between depositing adjacent layers of concrete within each section, unless specified set retarding admixture is used in concrete mix.
- H. Thoroughly compact, puddle, and vibrate concrete in corners and around reinforcing and embedded items. Use internal vibration where size of section permits.
- I. Place sections of concrete in sequence which eliminates shrinkage effects to greatest extent practicable.
- J. If concrete is to be placed by pumping, submit details of placement for review. Aluminum pipe is not permitted. Follow procedures specified in ACI 301.
- K. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- L. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

- M. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is CONTRACTOR 's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to ENGINEER.

3.12 FINISHING

- A. General: Except as otherwise specified in this Section of these Specifications, comply with the appropriate requirements of Chapters 10 (Finishing of Formed Surfaces) and 11 (Slabs) of the latest edition of ACI 301.
- B. Flatwork:
1. General
 - a. Tamp concrete to force coarse aggregate down from surface.
 - b. Screen with straight edge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains.
 - c. Dusting of surface with dry cement or sand during finishing processes not permitted.
 2. Tolerances: Finish to Class B tolerances (true plane to within 1/4 inch in any 10 foot length in any direction) as specified in ACI 301.
 3. Trowel finish:
 - a. Float surface to true, even plane.
 - b. Steel trowel to smooth, uniform finish, free of defects; steel trowel second time to final burnish finish; use edger on exposed edges.
 - c. Use on floor surfaces.

4. Broom finish:
 - a. Roughen surface with stiff broom.
 - b. Use on exterior slabs.
 5. Float finish:
 - a. Use on top of equipment foundation horizontal surfaces.
 - b. Finish to smooth, uniform, sandy finish, comparable to a Class B finish as specified in ACI 301, free of defects, ridges and high spots. Use edger on exposed edges including edges of chamfered corners.
 - c. Insure that smoothness and regularity of finish surface are adequate for the proper performance of any coatings, sealants or finishes which may be applied. Grind surface as necessary to achieved required finish within required tolerances.
- C. Formed surfaces:
1. Remove fins, projections, and loose material. Ease edges including chamfers to a radius of approximately 1/4 inch. Use a power grinder, if necessary, to remove projections and provide a flush surface.
 2. Clean surfaces of form oil.
 3. Patch honeycomb, aggregate pockets, voids, and holes as follows:
 - a. Chip out until sound concrete is exposed to minimum depth of 1 inch. Cut corners square, feathered edges are not permitted.
 - b. Prepare patching mortar with approximately 2 parts normal Portland cement, one part cement, 9 parts fine aggregate; vary proportions of cement as necessary to match color of adjacent concrete.
 - c. Apply bonding agent to surfaces and fill cavities with patching mortar.
 4. Fill holes left by form ties with patching mortar.
 5. Cure patches as specified for concrete.
 6. Grout Cleaning
 - a. Chapter 10, ACI 301
 - b. Grout clean surfaces to produce a smooth uniform surface free of marks, voids, surface glaze, and cement dust.

- c. Grout clean: Exposed exterior concrete wall surfaces from a point 6" below finished grade up to and including top of walls.
 - d. Formed concrete surfaces which are 6" below normal water levels or are below gratings or solid covers, do not require grout cleaning.
 - e. Formed concrete surfaces that receive textured coatings where shown on drawings do not require grout cleaning.
7. Rub all exposed surface above ground line and low water lever (LWL) to uniform surface and texture. Use cement/sand mortar mix as required.

3.13 CURING AND PROTECTION OF CONCRETE WORK

- A. General: Conform to requirements of ACI 301. Protect concrete from injury due to wind, sun, cold weather, running water, construction operations, and other causes.
- B. Curing of concrete shall begin immediately after placing and finish operations are complete.
- C. Cure concrete by one of the following methods:
 - 1. Liquid membrane forming compound curing:
 - a. Apply two coats with second coat at right angle to first coat.
 - b. Apply in strict accordance with manufacturer's written direction.
 - c. Do not use liquid membrane forming curing compounds on floors or other surfaces to receive a sealer hardener, seamless or other flooring, or any other finish without the prior approval of the ENGINEER.
 - 2. Plastic film curing:
 - a. Dampen surface of concrete and lay plastic film with minimum 6" side laps; tape side laps.
 - b. Hold film in place with lumber or use similar provisions to prevent exposure of concrete for 7 days after placing.
 - 3. Water curing:
 - a. Keep concrete continuously wet for 7 days after placing.
 - b. Use on concrete surfaces not receiving compound or plastic film curing.
 - c. Clean, nonstaining burlap may be used with water curing.

- D. Maintain minimum concrete temperature of 50 F for 72 hours after placing; maintain minimum concrete temperature above 32 F for 5 additional days.
- E. Provide windbreaks and shading where required to prevent rapid setting and surface moisture evaporation.

3.14 APPLICATION OF CONCRETE FLOOR HARDENER

- A. Apply to all concrete floors except area to receive other finishes.
- B. Apply in strict accordance with manufacturer's written directions. Use three coat applications.
- C. Age of concrete at time of first coat: 30 days minimum.
- D. Clean concrete prior to first coat.

3.15 REMOVING FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.16 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to ENGINEER.

3.17 FIELD QUALITY CONTROL

- A. The OWNER shall retain the services of an independent testing laboratory to perform field quality control tests to insure compliance with project requirements.
- B. Field quality control testing shall include but not be limited to the following:
 - 1. Slump: One test for each load in accordance with ASTM C143.
 - 2. Air Content: One sample from each batch from which test cylinders are made in accordance with ASTM C.
 - 3. Temperature: Measure and record temperature of fresh concrete from each batch from which compression test specimens are made.
 - 4. Compression Tests:
 - a. Make one set of not less than 6 compression test specimens from each 50 cubic yards or portion thereof of each concrete class placed in any day. Additional pairs of compression test specimens may be made by the CONTRACTOR at his discretion to aid him in determining when forms may be removed.
 - b. Test specimens shall be 6-inch diameter x 12-inch-long cylinders.
 - c. Make test specimens and provide initial curing done as specified in ASTM C31. After initial curing is complete, each set shall be transported to the testing laboratory and curing continued in accordance with ASTM C. Remaining compressive test specimens shall be field cured as specified in ASTM C31.
 - d. Test specimens in accordance with ASTM C39, two at 7 days, two at 28 days, and two to be retained for later testing if necessary.
- C. Concrete used solely for blocking of water line valves or fittings will not require testing. It shall, however, be subject to acceptance by the ENGINEER as to its suitability.
- D. Evaluation and Acceptance of Concrete
 - 1. Strength
 - a. Concrete strength shall be considered to be satisfactory if both of the following criteria are met:
 - 1) The average strength of each set of laboratory cured cylinders tested at 28 days meets or exceeds the specified 28 day strength f'_c ;

- 2) No individual cylinder has a strength which is less than 500 psi less than the specified 28 day strength f'_c .
 - b. Concrete represented by cylinders which do not meet the strength criteria specified but which do achieve the specified strength at a greater age do not meet the specified requirements but may be accepted by the ENGINEER at his discretion.
 - c. Concrete members for which the concrete strength does not meet specified criteria shall be repaired or strengthened by the CONTRACTOR at his expense as directed by and to the satisfaction of the ENGINEER. If repairs and/or strengthening of the structure cannot be made or have not been made so that the results are satisfactory to the ENGINEER, the CONTRACTOR shall remove the unsatisfactory members and replace them using concrete which does meet the specified requirements. The costs of tests and any ENGINEERING analyses resulting from the evaluation of any concrete determined to be defective as the result of the tests of concrete cylinders shall be borne by the CONTRACTOR.
2. Location and dimensions of concrete members shall be evaluated in accordance with Section 18.2 of ACI 301.
 3. Appearance of finished concrete shall be evaluated in accordance with Section 18.3 of ACI 301.
- E. Deficient concrete shall be removed as directed by the ENGINEER and replaced by the CONTRACTOR without additional cost to the OWNER.

3.18 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to ENGINEER.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of ENGINEER. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01-inch-wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycombs, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to ENGINEER.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- F. Perform structural repairs with prior approval of the ENGINEER for method and procedure, using specified epoxy adhesive and mortar.

- G. Repair methods not specified above may be used, subject to acceptance of ENGINEER.

END OF SECTION

SECTION 03350
CONCRETE FINISHING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and finish cast-in-place concrete surfaces as specified herein and as indicated on the Drawings.

1.02 RELATED WORK

- A. Concrete and finishing for walkway and pavements is included in Division 2.
- B. Concrete formwork is included in Section 03100.
- C. Patching and repair of defective and honeycombed concrete is included in Section 03300.
- D. Grout is included in Section 03600.
- E. Painting, toppings and special surfaces are included in Division 9.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, Contractor Submittals showing materials of construction and details of installation for:
 - 1. Concrete sealer. Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations and Material Safety Data Sheet. Also submit confirmation that the sealer is compatible with additionally applied coatings.
 - 2. Chemical hardener. Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations and Material Safety Data Sheet. Also submit confirmation that the hardener is compatible with sealer.

1.04 REFERENCE STANDARDS

- A. ASTM International
 - 1. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Services of Manufacturer's Representative

- 1. Make available at no additional cost to the OWNER, upon 72 hours notification, the services of a qualified field representative of the manufacturer of sealer or hardener to instruct the CONTRACTOR on the proper application of the product under prevailing job conditions.

1.06 RESPONSIBILITY FOR CHANGING FINISHES

- A. The surface finishes specified for concrete to receive coatings or other finish materials are those required for the proper application of the products specified under other Sections. Where products different from those specified are approved for use determine if changes in finishes are required and provide the proper finishes to receive these products.
- B. Perform changes in finishes made to accommodate products different from those specified at no additional cost to the OWNER. Submit the proposed new finishes to the ENGINEER for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cementitious and component materials required for finishing concrete surfaces: As specified in Section 03300.
- B. Chemical hardener: Lapidolith by BASF Building Systems; Hornolith by Tamms; Surfhard by the Euclid Chemical Co. or equal fluosilicate base material.
- C. Concrete sealer: A penetrating silicate-based liquid densifier and sealer. Euco Diamond Hard by the Euclid Chemical Company; Protecrete Densifier by Applied Concrete Technology Inc.; Sikagard 701W by Sika Corp.; or equal.
- D. Concrete sealer: "Kure-N-Seal", by BASF Building Systems or equal acrylic sealer.

PART 3 EXECUTION

3.01 FORMED SURFACES

- A. Form removal: Conform to Sections 03100 and 03300.

- B. Do not damage edges or obliterate the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
- D. Off-Form Finish
 - 1. Remove fins and other projections and fill tie cones and defects as specified in Section 03300.
- E. Rubbed Finish
 - 1. Immediately upon stripping forms and before concrete changes color, carefully remove all fins with a hammer. While the surface is still damp apply a thin coat of medium consistency neat cement slurry using bristle brushes to provide a bonding coat within all pits, air holes or blemishes in the parent concrete. Do not coat large areas of the surface with this slurry.
 - 2. Before the slurry dries or changes color, apply a dry (almost crumbly) grout consisting of one volume cement to 1-1/2 volumes of clean masonry sand having a fineness modulus of approximately 2.25 and complying with the gradation requirements of ASTM C144. Apply grout uniformly using damp (neither dripping wet nor dry) pads of coarse burlap approximately 6-in square used as a float. Scrub grout into the pits and air holes to provide a dense mortar in the imperfections to be patched.
 - 3. Allow the mortar to partially harden for one or two hours depending upon the weather. If the air is hot and dry, keep the surface damp during this period using a fine, fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the perpendicular edge of a steel trowel without damaging the grout in the small pits or holes, cut off all grout that can be removed with a trowel. Grout allowed to remain on the surface too long will get too hard and will be difficult to remove.
 - 4. Allow the surface to dry and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout should remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow grout to dry after it has been cut off with the trowel so it can be wiped off clean with the burlap.
 - 5. On the day following the repair of pits, air holes and blemishes, the surfaces again shall be wiped off clean with dry, used pieces of burlap containing old, hardened mortar which will act as a mild abrasive. After this treatment, there shall be no built-up film remaining on the parent surface. If, however,

a built-up film remains, use a fine abrasive stone to remove all such material without breaking through the surface film of the original concrete. Scrub lightly to remove excess material without working up a lather or mortar or changing the texture of the concrete.

6. Follow the final bagging or stoning operation with a thorough wash-down with stiff bristle brushes to remove extraneous materials from the surface. Spray the surface with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.
7. The Rubbed Finish application may be deleted by the ENGINEER if the unfinished concrete surface is of superior quality and without surface voids.

3.02 FLOORS AND SLABS

- A. Consider the potential for longer setting time in concrete containing fly ash or ground granulated blast furnace slag.
- B. Compact with internal vibrators as specified in Section 03300 and screed to the established grades. Provide floors and slabs level with a tolerance of 1/8-in when checked with a 12-ft straightedge, except where drains occur, in which case pitch floors to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as directed by the ENGINEER, at no additional cost to the OWNER.
- C. Following screeding as specified above, float the slabs as approved by the ENGINEER. Continue floating operation until sufficient mortar is brought to the surface to fill all voids. Test the surfaces with a straightedge to detect high and low spots which shall be eliminated. Do not overwork the concrete as evidenced by excess water and fine material on the surface.
- D. Do not use "jitterbugs" or other special tools designed for the purpose of forcing the coarse aggregate away from the surface and allowing a layer of mortar to accumulate on any slab finish. Do not dust surfaces with dry materials. Round off all edges of slabs and tops of walls with a steel edging tool. Use steel edging tool with radius of 1/4-in for all slabs subject to wheeled traffic.
- E. Measure floor flatness the day after a concrete floor is finished and before the shoring is removed, in order to eliminate any effects of shrinkage, curling and deflection. A 12-ft long straightedge shall be supported at each end with steel gauge blocks whose thickness are equal to tolerance specified. Floor surface shall not have crowns so high as to prevent 12-ft straightedge from resting on the two end blocks, nor low spots so low that a third block of twice the tolerance in thickness can pass under the supported straightedge. Compliance with the designated limits in four of five consecutive measurements will confirm compliance, unless obvious faults are

observed. A check for adequate slope and drainage will also be made to confirm compliance.

F. Descriptions

1. Steel Trowel Finish. Finish by screeding and floating with straightedges to bring the surfaces to the elevations indicated. While the concrete is still green, but sufficiently hardened to bear a person's weight without deep imprint, the surface shall be wood floated to a true, even plane with no coarse aggregate visible. Apply sufficient pressure on the wood floats to bring moisture to the surface. After surface moisture has disappeared, hand steel trowel to produce a smooth, impervious surface, free from trowel marks. Trowel the surface again for the purpose of burnishing. The final troweling shall produce a ringing sound from the trowel. Do not use dry cement or additional water in troweling.
2. Wood Float Finish. Finish by screeding with straightedges to bring the surfaces to the elevations indicated. Use a wood float to compact and seal surface. Remove all laitance and leave a clean surface.
3. Light Broomed Finish. Steel trowel finish the concrete, as specified above but omit the final troweling and finish the surface by drawing a fine-hair broom lightly across the surface. Broom in the same direction and parallel to expansion joints, or in the case of inclined slabs, perpendicular to the slope, or except as directed otherwise.
4. Broomed Finish. Steel trowel finish the concrete, as specified above but omit the final troweling. While the concrete is still soft enough, finish the surface with a stiff coarse fiber broom to produce the pattern and depth of scoring as approved by the ENGINEER.
5. Power Machine Finish. In lieu of hand steel trowel finishing, an approved power machine for finishing concrete floors and slabs may be used in accordance with the directions of the machine manufacturer and as approved by the ENGINEER. Do not use a power machine until the concrete has attained the necessary set to allow finishing without introducing high and low spots in the slab. Hand steel trowel the areas of slabs not accessible to power equipment. Provide a final steel troweling done by hand over all areas.

G. Concrete Sealer

1. Prepare and seal surfaces indicated on the Drawings to receive a sealer as follows:

- a. Finish concrete as specified in the preceding paragraphs and in accordance with the Schedule of Finishes in Paragraph 3.05 below.
- b. Newly Placed Concrete: Surface must be sound and properly finished. Surface is application-ready when it is damp but not wet and can no longer be marred by walking workers.
- c. Newly-Cured Bare Concrete: Level any spots gouged out by trades. Remove all dirt, dust, droppage, oil, grease, asphalt and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry so that surface is no more than damp, and not wet.
- d. Existing Concrete: Restore surface soundness by patching, grouting, and filling cracks and holes. Surface must also be free of any dust, dirt and other foreign matter. Use power tools and/or strippers to remove any incompatible sealers or coatings. Cleanse as required, following the procedure indicated under cured concrete.
- e. Application: Apply sealer so as to form a continuous, uniform film by spray, soft-bristle push broom, long-nap roller, lambswool applicator, or ordinary garden-type sprayers.
- f. For curing only, two coats are required. Apply first coat evenly and uniformly as soon as possible after final finishing at the rate of 200 to 400 sq ft per gallon. Apply second coat when all trades are completed and structure is ready for occupancy at the rate of 400 to 600 sq ft per gallon.
- g. To seal and dustproof, two coats are required. For sealing new concrete, both coats shall be applied full-strength. On aged concrete, when renovating, dustproofing and sealing, the first coat should be thinned 10 to 15 percent with reducer per manufacturer's directions.

3.03 CONCRETE RECEIVING CHEMICAL HARDENER

- A. After 28 days, minimum, concrete cure, apply chemical hardener in three applications to a minimum total coverage of the undiluted chemical of 100 sq ft per gallon and in accordance with manufacturer's recommendations as reviewed.

3.04 APPROVAL OF FINISHES

- A. All concrete surfaces, when finished, will be inspected by the ENGINEER.
- B. Refinish or rework unsatisfactory finishes until approved by the ENGINEER, at no additional cost to the OWNER.

- C. Hardened unsatisfactory finishes will require removal, grinding, or other appropriate correction approved by the ENGINEER, at no additional cost to the OWNER.

3.05 SCHEDULE OF FINISHES

- A. Finish concrete in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section. Where products different from those specified are approved for use comply with the requirements of Paragraphs 1.06A and 1.06B.
- B. Finishes to the base concrete for the following conditions shall be as scheduled below and as further specified herein:
 - 1. Exposed exterior concrete excluding slabs and walking surfaces - Rubbed finish. (Rub open tank walls above and to 1-ft below normal water line).
 - 2. Concrete for exterior on stairs and other horizontal areas - Broomed finish, non-slip.
 - 3. Exposed interior concrete including underside slabs, beams and stairs and sides of openings, beams and stairs - Rubbed finish.
 - 4. Concrete for interior walking surfaces excluding stairs – wood float finish.
 - 5. Concrete for interior stairs and metal pan stairs - Light broomed finish, non-slip.
 - 6. Walls of open topped tanks - Rubbed finish above and to 1-ft below normal water line. Off-form finish from 1-ft below normal water line to base of wall.
 - 7. Concrete stairs, landings and platforms below normal water level in liquid retaining structures – Broomed finish, non-slip.
 - 8. Tops of curbs and pads - Steel trowel finish.
 - 9. Concrete on which liquids flow or are contained - Steel troweled finish.
 - 10. Concrete not exposed in the finished work and not scheduled to receive an additional applied finish or material - Off-form finish at vertical surfaces, consolidate and screed to grade at horizontal surfaces.
 - 11. Concrete tank bottoms to be covered with grout - Broom finish as approved. See Section 03600 for additional requirements.

12. Concrete to receive dampproofing - Off-form finish.
13. Concrete to receive capillary waterproofing - Off-form finish at vertical and overhead surfaces, light broomed finish at horizontal surfaces.
14. Concrete to receive cementitious slurry waterproofing - Off-form finish at vertical surfaces, light broomed finished horizontal surfaces.
15. Concrete to receive chemical hardener - Light broomed finish, non-slip, except at electrical rooms and areas and generator room provide wood float, non-slip.
16. Concrete to receive paint - Rubbed finish.
17. Concrete to receive floor sealer - See Paragraph 3.02G above.
18. Concrete to receive seamless flooring - Once-over steel trowel finish.
19. Concrete to receive ceramic and quarry tile - Broomed finish as approved.
20. Concrete to receive vinyl and rubber surfacing and carpet - Steel trowel finish.

END OF SECTION

SECTION 03600
GROUTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Grout for steel baseplates

1.02 REFERENCE STANDARDS

- A. American Society for Testing and Materials:
 - 1. ASTM C1090, Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout
 - 2. ASTM C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrinkable)
- B. Corps of Engineers:
 - 1. CRD-C621, Specification for Non-Shrink Grout

1.03 SUBMITTALS

- A. Product Data: submit manufacturer's data indicating product compliance for the following:
 - 1. Non-shrink grout.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store grout materials in dry condition above ground.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Non-Shrink Grout:
 - 1. Pre-mixed non-shrinking, high strength grout.
 - 2. Compressive strength in 28 days: 5000 psi minimum, but not less than specified strength of base concrete.
 - 3. Comply with ASTM C1107, and CRD-C621.

4. Nonoxidizing, if grout will be permanently exposed to view.
5. Exhibits positive expansion when testing in accordance with ASTM C1090.

PART 3 EXECUTION

3.01 PREPARATION

A. Surface preparation:

1. Clean slab or foundation of dirt and loose material down to sound concrete.
2. Remove oil, grease, and paint from areas of base plates or foundations to be grouted.
3. Roughen adjacent concrete surfaces where possible.
4. Thoroughly wet concrete contact area at least 4 hours prior to grout placement, or as instructed by grout manufacturer. Keep wet, and remove excess water prior to placement.

B. Mixing

1. Use mechanical mortar mixer.
2. Use the minimum amount of mixing water needed for placement.
3. Comply with manufacturer's recommendations for:
 - a. Quantity of water used in mix.
 - b. Length of mixing time.
 - c. Pot life.
 - d. Retempering.

C. Forms

1. Use side forms if grout space is thicker than 1-1/2 inches.
2. When forms are required, use strong, securely anchored forms, sealed to prevent grout leakage.
3. Remove forms only after grout is completely self-supporting.

3.02 APPLICATION

A. Placement and Consolidation

1. Bearing plates shall be fully grouted, without cavities, pockets, or air bubbles.
2. Place grout continuously, and from one side to avoid entrapment of air pockets and to ensure good consolidation.
3. Remove voids by rodding and vibrating during placement.
4. Do not overwork grout.
5. Use grout holes for baseplates larger than 24 inches in width.

B. Curing

1. Comply with manufacturer's recommendations for curing.
2. Do not vibrate or disturb grout during curing period.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SUMMARY

- A. Types of steel required include the following:
 - 1. Wide Flange Shapes
 - 2. Channel Shapes
 - 3. Angles
 - 4. Plates
 - 5. Hollow Structural Sections
 - 6. Structural Pipes
- B. When outriggers, angles, or other components are not attached to the open web steel joists in the shop in such a way that they actually are a component part of the joists, they are to be provided under this Section.
- C. The Work includes Outrigger supports and wall anchors not associated with steel joists.
- D. Section includes structural steel framing members, and structural steel support members with required bracing, welds, and fastenings.

1.02 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications

1.03 REFERENCES

- A. American Institute of Steel Construction:
 - 1. AISC S302 - Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC S326 - Specification for Design, Fabrication and Erection of Cold-Formed Structural Members for Buildings.
 - 3. AISC S329 - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

- B. American Society for Testing and Materials:
 - 1. ASTM A36 - Structural Steel.
 - 2. ASTM A307 - Carbon Steel, Bolts and Studs, 60,000 psi Tensile Strength.
 - 3. ASTM A325 - High-Strength Bolts for Structural Steel Joints.
 - 4. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- C. American Welding Society, Inc.:
 - 1. AWS D 1. 1 - Structural Welding Code.
- D. Federal Specifications:
 - 1. FS TT-P-31 - Paint, Oil: Iron Oxide, Ready Mix, Red and Brown.
- E. SSPC - Steel Structures Painting Council.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01340 – Shop Drawings, Product Data, and Samples:
 - 1. Shop drawings:
 - a. Indicate profiles, sizes, spacing, and locations of structural members, connections, attachments, fasteners, cambers, and loads.
 - b. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
 - 2. Product data on primer.
 - 3. Certificates for welders employed on Work verifying AWS qualification within previous 12 months.

1.05 QUALITY ASSURANCE

- A. Except as indicated otherwise, comply with provisions of AISC S302, AISC S326, AISC S329, and AWS D1.1.
- B. Qualify welding processes and welding operators in accordance with AWS.
- C. Design connections not detailed on Drawings under direct supervision of

Structural Steel
Aztec Reservoir #1 Improvements

Professional Structural Engineer licensed in the State of New Mexico.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Members: Conform with ASTM A36, minimum yield strength of 36,000 psi.
- B. Structural Tubing: Conform with ASTM A500, Grade B, minimum yield strength of 46,000 psi.
- C. Bolts, Nuts, and Washers: Conform with ASTM A325.
- D. Welding Materials: Conform AWS D1.1; type required for materials being welded.
- E. Primer: FS TT-P-31, red oxide.
- F. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 5,000 psi at 28 days.

2.02 FABRICATION

- A. Fabricate structural steel members in accordance with AISC Specifications.
- B. Fabricate and assemble structural members in shop to greatest extent possible. Properly mark and match-mark materials for field assembly.
- C. Completely assemble, including welding of units before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- D. Connections: Weld or bolt shop connections as indicated on Drawings. Install high strength threaded fasteners in accordance with AISC S329.
- E. Welded construction: Comply with AWS welding code for procedures, appearance, and quality of welds and methods used in correcting welding work.
- F. Holes for other work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as shown on approved shop drawings. Cut, drill, or punch hole perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.

2.03 FINISH

- A. Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Do not paint surfaces to be welded or high strength bolted with friction type connections.
- B. Preparation: After inspection and before shipping, clean steel work to be painted, Remove loose rust, loose mill scale, spatter slag, and flux deposits. Clean steel in accordance with SSPC standards.

PART 3 - EXECUTION

3.01 ERECTION

- A. Erect structural steel in accordance with AISC Specifications.
- B. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Do not field cut or alter structural members without approval of the Architect.
- D. Tighten anchor bolts after supported members have been positioned and plumbed.
- E. Pack nonshrink grout solidly between bearing surfaces and base plates to ensure that no voids remain.
- F. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC tolerances.
- G. Splice members only where indicated on approved shop drawings.
- H. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
- I. Do not enlarge holes by burning or use of drift pins . Ream holes that must be enlarged to admit bolts.

3.02 TOUCH-UP

- A. After erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed area with same materials as used for shop

painting. Apply by brush or spray to provide minimum dry film thickness of 2.0 mils.

PART 4 – MEASUREMENT & PAYMENT

- A. Work covered in this section of the specifications, and associated costs therewith, shall be included in the lump sum bid item to which the work applies. No separate payment shall be made.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Structural steel.
- B. Metal shapes, plates, sheets, rods, bars or castings.
- C. Ship stairs and grating.
- D. Aluminum pipe and tube handrails, banister and fittings.
- E. Metal anchorage mounting materials and accessory items.
- F. Metal hatches.

1.02 RELATED WORK

- A. Section 03300: Cast-in-Place Concrete
- B. Section 05501: Anchor Bolts, Expansion Anchors and Adhesive Anchors
- C. Section 05502: Engineered Stairway
- D. Section 09901: Painting and Special Coating

1.03 REFERENCES

- A. Section 01340: Shop Drawings, Product Data, Samples
- B. Section 01600: Material and Equipment
- C. ASTM and ANSI Standards as indicated in Part 2 of this Section.
- D. AWS D1-1 Structural Welding Code
- E. AISC Steel Construction Manual.

1.04 SUBMITTALS

- A. Supplemental Conditions of the contract: American Iron and Steel Certifications
- B. Section 01340: Shop Drawings, Product Data, Samples:

1. Product data describing each manufactured metal specialty.
 2. Shop drawings describing each fabricated item.
 3. Grating system.
 4. Handrail system.
- C. Erection drawings for structural steel.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store on blocking so that no metal touches the ground and water cannot collect thereon.
- B. Protect from bending under its own weight and from superimposed loads.

1.06 GENERAL REQUIREMENTS

- A. Grating to have similar pattern throughout work.
- B. Handrails to have a similar pattern throughout work.
- C. Hatches to have a similar pattern throughout work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel:
 1. Plates and shapes: ASTM A36.
 2. Sheets: ASTM A366 or A569, zinc coated.
 3. Pipe: ASTM A120.
 4. Bolts:
 - a. High strength: ASTM A325.
 - b. Unfinished: ASTM A307.
 - c. Self-locking nuts:
 - i. Prevailing torque type.
 - ii. IFI-100, Grade A.

- d. Flat washers: ANSI B27.2.
 - e. Lock washers: Spring type, ANSI B27.1.
 - f. Beveled washers:
 - i. Table 1 of Specifications for Structural Joints using ASTM S325.
 - ii. A490 Bolts, AIS Steel Construction Manual.
5. Checkered plate: FS QQ-F-461.
 6. Rails:
 - a. Crane: AISC Steel Construction Manual.
 - b. Railroad: ASTM A1.
 7. Grating: FS RR-G-661, Type I, rectangular, welded, galvanized after fabrication.
- B. Cast Iron: ASTM A48, Class 25 or better.
- C. Stainless Steel: 18-8:
1. Plates: ASTM A167.
 2. Fasteners: IFI 104, Grade 304.
- D. Aluminum:
1. Sheet and plate: ASTM B209, alloy 6061-T6.
 2. Rolled sections: ASTM B308, alloy 6061-T6.
 3. Rod and bar: ASTM B211, alloy 6061-T6 or 2071-T4.
 4. Extrusions: ASTM B221, alloy 6063-T5 or T6.
 5. Pipe: ASTM B429, alloy 6061-T6 or 6063-T6.
 6. Rivets: ASTM B316, alloy 6061-T6.
 7. Bolts: IFI-104, Grade 24T4.
 8. Castings: ASTM B26 or B85.
 9. Checkered plate: Alcoa C 102.

10. Grating:
 - a. ASTM B221, alloy 6063-T6.
 - b. I-beam sections integrally welded to extrusion, mechanically locked.
- E. Specialty and Accessory Items:
 1. Chain:
 - a. FS RR-C-271, Type I, Grade C, Class 5, Style 2, galvanized.
 - b. Welded steel, twist-link style, short-link pattern.
 2. Handrail-setting cement where allowed by ENGINEER: ASTM C595 hydraulic-quick setting cement, factory-prepared with accelerator.
 3. Grating saddle clips and flange block:
 - a. ANSI A202.1.
 - b. Steel grating: Galvanized steel clips.
 - c. Aluminum grating: Aluminum or stainless steel clips or blocks.
 - d. Clip fasteners:
 - i. Nelson stud-type bolts.
 - ii. ¼" minimum, galvanized or corrosion resistant alloy.
- F. Shop Coatings:
 1. Section 09901.
 2. Galvanizing:
 - a. Hot-dip: ASTM A123, A668 and A385.
 - b. Zinc-coated: ASTM B633, Type GS.
 - c. Cadmium: ASTM A165, Type NS.

2.02 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
 - B. Fabricate items with joints tightly fitted and secured
 - C. Fit and shop assemble in largest practical sections for delivery to site.
 - D. Exposed Welds and Edges:
 - 1. Grind exposed welds flush and smooth with adjacent finished surface.
 - 2. Ease exposed edges to small uniform radius.
 - E. Exposed Mechanical Fastenings:
 - 1. Flush, countersunk screws or bolts, unobtrusively located.
 - 2. Consistent with design of structure, except where specifically noted otherwise.
 - F. Connections:
 - 1. Welded: AWS D1-1:
 - a. Butt and miter welds: continuous.
 - b. Exposed welds: ground smooth.
 - c. Intermittent welds:
 - i. 2" minimum effective length.
 - ii. 6" maximum spacing.
 - 2. Bolted:
 - a. For girts with slotted or oversized holes.
 - b. Unfinished bolts with self-locking nuts or lock washers.
 - 3. Shop connections: bolted, welded or riveted.
- Coating:
- 1. Section 09901.
 - 2. Galvanizing: apply after fabrication.

3. Casting: hot dip in asphalt varnish or coat with coal tar paint, 6 mils minimum.
4. Metal surfaces to be in contact with concrete, mortar or dissimilar metals: coal tar paint, 6 mils minimum.

B. Checkered Floor Plate and Access Hatches:

1. Minimum thickness:
 - a. 1/4" for steel.
 - b. 3/8" for aluminum.
2. Steel plate:
 - a. Hot-dip galvanized after fabrication.
 - b. With lifting hole if not bolted or welded in place.
 - c. Plates to lie perfectly flat.
3. Supporting steel members:
 - a. Hot-dip galvanized after fabrication.
 - b. Lifting handles where indicated.
4. Aluminum plate supporting members: structural steel, hot-dip galvanized.

C. Hand Railings:

1. Aluminum:
 - a. 1-1/2" Schedule 10 pipe railings and Schedule 40 posts or
 - b. 2 in tubing with wall thickness of 1/8" minimum.
 - c. Clear satin anodized finish on all exposed surfaces.
 - i. 0.4 mil thickness for cast components.
 - ii. 0.7 mil thickness for extruded components.
2. Connections: cope members and continuously weld or connect mechanically at all junctions to provide finished appearance similar to welded system.

3. Sleeves:
 - a. Fixed posts: standard weight black steel pipe, 6" minimum diameter to provide 1/4" or larger clearance around post.
 - b. Removable posts:
 - i. Standard weight black steel pipe, outer sleeve.
 - ii. Schedule 40 PVC pipe, inner sleeve.
4. Safety chain:
 - a. Where indicated on Drawings.
 - b. 1/4" chain, length as required by opening.
 - c. Fastened to one post with stainless steel eyebolt.
 - i. Fastened to other post by a 2-1/2", heavy-duty, cadmium-plated harness strap engaging a similar eyebolt.
 - ii. At every horizontal member.
5. Toe plates:
 - a. 1/4" thick aluminum toe plates around all openings extending the full depth and 4" above top of walking surface.
 - b. Not required on stairs.
 - c. Connected to each post.

D. Grating:

1. ANSI A202.1.
2. Depth of bearing bars:
 - a. Suitable to achieve maximum deflection of 1/4" at 100 psi for actual span.
 - b. Minimum depth: 1-3/4".
3. Laid out with openings centered on joint between sections.

4. 3/16" thick, full depth bands at ends of bearing bars in grating floor sections.
5. Weld bands to first, last and every fourth intermediate bearing bar.
6. Cut cross bars flush with outside face of side bars.
7. Cutting:
 - a. Angular, circular and re-entrant cuts: flame cutting in steel.
 - b. All other cuts: sawed or sheared.
 - c. Clean and smooth without fins, beads or other projections.
8. Fabricate in easily-handled panels.
9. Maximum piece weight: 75 lbs unless otherwise approved by ENGINEER.
10. Align cross bars and edge bars of adjacent panels.
11. Maximum clearance between panels: 3/4".
12. Make all bearing bars parallel.
13. Make all gratings flat with no tendency to rock.
14. Tolerance:
 - a. Length: $\pm 3/16$ ".
 - b. Width: $\pm 1/8$ ".
 - c. Max difference or opposite diagonals: 1/4".
 - d. Bearing bar spacing: $\pm 1/32$ ".
 - e. Bend vertical and horizontal alignment $\pm 1/8$ ".
 - i. Maximum opening between grating and openings for equipment extending above top of grating: 2".
 - ii. Maximum grating opening for stop plates: 2-1/2".
15. Steel grating:

- a. Hot-dip galvanized after fabrication.
- b. Welded or pressure locked.
- c. Bearing bars: 3/16" thick minimum at 1-3/16" centers.
- d. Straightened after galvanizing.
- e. Frames: hot-dip galvanized steel or aluminum, cast in concrete.

16. Aluminum grating:

- a. Pressure-locked type.
- b. Treads may be pressure-locked or one-piece extrusions.
- c. Bearing bars: 3/16" minimum flat stock or equivalent I-bars at 1-3/16" centers minimum.
- d. Frames: aluminum, cast in concrete.

17. Stair treads:

- a. With carrier plates and abrasive nosing.
- b. Fastened to stringers with stainless steel bolts.
- c. Aluminum.

E. Crane and Hoist Runway Beams:

- 1. Structural steel I-beams as indicated on Drawings.
- 2. Upper surface of the lower flange smooth with all projections ground off.
- 3. End stops:
 - a. Locate at each end of I-beams.
 - b. Fabricated from angles.
 - c. Bolted in place.
 - d. Located so crane or hoist does not contact structure or piping.

F. Metal Ladders and Safety Cage:

1. Steel or aluminum shapes as indicated on Drawings.
2. Hot-dip galvanized steel after fabrication.
3. All necessary galvanized or stainless steel brackets, bolts and anchors.
4. Aluminum ladders:
 - a. Fabricated from 1-1/2" IPS Schedule 40 aluminum pipe uprights and 1" solid round aluminum rungs.
 - b. After fabrication, ladders shall be given an Aluminum Association Standard Anodic finish, Designation C22A31, followed by a shop coat of methylacrylate lacquer.
5. Steel ladders shall be sand blasted to white metal and field galvanized.

G. High Incline Access Stair (Ship Stair):

1. Manufacturer: Lapeyre Stair, www.lapeyrestair.com, or Engineer approved equivalent
2. Alternating tread layout
3. Frame and treads: steel
4. Incline angle 56 degrees.
5. Rail Type: Standard
6. Finish: Powder Coat. Color: Yellow
7. The treads shall be designed to support a live load of 200 lb/ft².
8. All structural steel accessories and anchors required to complete the installation in a finished and safe manner shall be furnished and installed.
9. As shown on Drawings.

H. Rolling Steel Door Frames:

1. Structural steel shapes as indicated on Drawings.
2. Fully weld corners and dress welds smooth on exposed surfaces.
3. Jamb anchors and sill clip angle for frames set in masonry.

4. Sand blast and finish by grinding until all exposed surfaces are smooth.
5. Body solder as required to fill joints and provide a finishable surface.

I. Access Doors:

1. Materials: structural aluminum cover and frame.
2. Hardware:
 - a. Stainless steel.
 - b. Provide for padlock.
3. Units capable of side-by-side installation using cleats.
4. Nut rail incorporated in frame.
5. 150 psi rated unless otherwise indicated.
6. Slight variation in dimensions allowed to accommodate manufacturer's standard product.
7. Provided by submersible pump manufacturer unless otherwise approved by ENGINEER.
8. Acceptable door manufacturers:
 - a. Flygt Corporation.
 - b. Halliday Products.
 - c. or approved equivalent.
9. Size as indicated on Drawings.

PART 2 EXECUTION

2.01 PROTECTION

- A. All surfaces shall be protected against scratches, dents and other damage during shipment, storage and erection.

2.02 PREPARATION

Metal Fabrications
Aztec Reservoir #1 Improvements

05500-11

- A. Before assembly, thoroughly clean all parts that will be in contact with each other.

2.03 ERECTION AND INSTALLATION

- A. As indicated on the Drawings.

- B. General:

1. Installation and connections shall be as shown and specified and in accordance with manufacturer's recommendations.
2. All measurements shall be field-verified.
3. Cutting, drilling, punching, etc. required for any metal or adjacent work shall be performed prior to hot-dip galvanizing.
4. Field work will not be permitted on galvanized items.
5. Holes shall be punched 1/16" larger than nominal size of bolts unless otherwise indicated.
6. Holes shall not be drifted or enlarged to correct misalignments.

- C. Corrosion Protection:

1. Where aluminum surfaces contact dissimilar materials, except Type 304 or 316 stainless steel, the aluminum surfaces shall be kept from direct contact with such other materials by neoprene gaskets or polyethylene self-adhesive tape.
2. Galvanizing or paint will not be considered adequate protection.

- D. Connections:

1. As indicated on the Drawings.
2. Where welding is permitted or required:
 - a. Butt and miter welds continuous.
 - b. Exposed welds ground smooth.
 - c. Intermittent welds:
 - i. 2" minimum effective length.

- ii. 6" max spacing.
- 3. Light drifting is permitted to draw parts together.
- 4. No drifting to match unfair holes.
- 5. Enlarge holes, if necessary, by reaming with twist drills.
- 6. No burning to enlarge holes.
- 7. No field welding of structural steel, except as indicated on the Drawings.

E. Handrails:

- 1. Install with posts plumb and longitudinal members parallel to each other and to floor or slope of stairs.
- 2. All members in a section in true alignment with the same vertical plane.
- 3. Install posts with wall brackets unless otherwise indicated or required:
 - a. Anchor brackets with two stainless steel bolts and expansion anchors.
 - b. Anchor posts in brackets with two stainless steel bolts through post and bracket.
- 4. Attach fixed handrail posts to supporting structure:
 - a. Set in sleeves only where specifically indicated on Drawings.
 - b. Support sleeves in accurate alignment in forms.
 - c. Sleeve held below the finished concrete surface.
 - d. Measure the location of each sleeve before fabricating handrail.
 - e. Wedge post in accurate alignment and fill annular space and post to level of weep hole with handrail-setting cement.
 - f. Top surface of cement smooth finish and sloping away from post.
 - g. Where indicated, attach to structure with flanges and other special attachments or anchorages.
- 5. Removable sections:

- a. In double sleeves.
 - b. Inner sleeve in outer sleeve as specified for fixed posts.
 6. Field connections: locking mechanical splice fittings.
 7. Slip joints for expansion and contraction:
 - a. 30' max intervals.
 - b. Gap: Between 1/8" and 3/8".
 8. Post spacing: aluminum, 5' max.
 9. Provide weep holes in all embedded posts and in any railing where water will not otherwise drain.
 10. Coordinate handrails and installation so maximum clear opening between non-connected handrail sections, or handrails and equipment, or structures where handrails end at such, is 8".
 11. Install toe plates so maximum opening between plate and floor/structure is 3/8".
- F. Grating:
1. Avoid damage during installation.
 2. Unanchored where indicated on Drawings.
 3. Other grating:
 - a. Anchored in place.
 - b. Fasten with saddle clips or flange blocks in accordance with ANSI A202.1.
- G. Door Frames: anchor sill clip angles to concrete floors with 1/2" bolts and expansion anchors except as otherwise indicated.
- H. Stairways:
1. Intermediate anchorage as required to provide a stable, vibration-free installation.

2.04 FIELD QUALITY WORK

- A. Structural Steel Connections:
 - 1. Platform or other means of access for inspection of each field connection.
 - 2. Leave in place until inspected by ENGINEER.
- B. Handrail:
 - 1. Check final alignment with a tightly drawn reference wire.
 - 2. Max misalignment allowed: 1/8".
 - 3. Replace bent, damaged, or deformed railings.

2.05 ACCEPTANCE

- A. As a condition precedent for final acceptance of the Work, the CONTRACTOR shall certify the materials and installation included under this section to be free of defects and suitable for service under the conditions as shown on the Drawings and specified herein.

2.06 SCHEDULE

- A. Gratings: 1-1/2" I-bar aluminum gratings as shown on the Drawings.
 - 1. Minimum Section Properties:
 - a. $S_x = 0.9 \text{ in}^3$
 - b. $I_x = 0.675 \text{ in}^4$
 - 2. Minimum bar spacing: 15/16" o.c.
- B. Standard stairs as shown on the Drawings.
- C. Lapeyre stairs as shown on the Drawings.
- D. Handrail as shown on the Drawings.

END OF SECTION

SECTION 09901
PAINTING AND SPECIAL COATINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Exposed piping and other metal surfaces, interior and exterior.
- B. Submerged metal surfaces.
- C. Buried metal.
- D. Metal in contact with concrete
- E. Structural and miscellaneous steel.
- F. All other surfaces requiring protection.

1.02 WORK EXCLUDED

- A. The following materials, items and areas shall not be painted under this contract, except as noted:
 - 1. Surfaces of glass, china, ceramic tile vitreous enamel, chrome-plating, rubber, stainless steel, brass, bronze, copper, aluminum, fiberglass plastic and galvanized metal, except as listed hereinafter under "Painting Schedule," this Section or as indicated on Drawings.
 - 2. Insulated and jacketed piping and equipment.
 - 3. Concealed interior surfaces of concrete block.
 - 4. Interior surfaces of concrete floors, except as listed under "Painting Schedule," this Section or as indicated on Drawings.
 - 5. Concealed ductwork, piping, and conduit.
 - 6. Insulated metal ductwork.
 - 7. Resilient floor tile and wall base.
 - 8. Lubrication fittings, valve stems, shafting float rods, nameplates and instruments.
 - 9. Cast-iron outdoor manhole covers and cast-iron outdoor manhole cover frames.

10. Contact surfaces of rails and machined surfaces of equipment.
 11. Vinyl-coated conduit.
 12. Prefinished electric cable and conduit trays.
- B. The following items have either factory-applied permanent finishes or have been finish-painted by others, and shall not be painted under this contract:
1. Louvers not otherwise specified.
 2. Lighting fixtures.
 3. Unit heaters.
 4. Air handling units.
 5. Switchgear.
 6. Motor control centers.
 7. PVC coated conduits, boxes and fittings.
 8. Lighting panels.
 9. Wall-mounted motor starters and disconnect switches.
 10. Electrical switchgear, control panels and cabinets not otherwise specified.
 11. Acoustical ceiling tile and metal suspension system.
 12. Fusion Bond Epoxy Coated Surfaces

1.03 REFERENCES

- A. Section 01300: CONTRACTOR SUBMITTALS
- B. Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2: SSPC Specs".
- C. American Standard Scheme for the Identification of Piping Systems Standard A13-1.

1.04 SUBMITTALS

- A. Product Data sheets showing the following information:
 1. Percent solids by volume

2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
 3. Recommended surface preparation.
 4. Recommended thinners.
 5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coat
 6. Application instructions including recommended equipment and temperature limitations.
 7. Curing requirements and instructions.
- B. Schedule of products to be used and mil thicknesses to be applied in accordance with manufacturer's recommendations.
- C. Manufacturer's standard color selection chart.

1.05 ADDITIONAL REQUIREMENTS

- A. Workmanship:
1. Work to be done by skilled craftsmen in a manner comparable with the best standards of practice found in each trade.
 2. Applicable surface preparation, coating and painting to conform to the requirements of the Steel Structures Painting Council manual.
 3. CONTRACTOR to provide a resident supervisor during cleaning and coating operations.
 4. Supervisor to have authority to sign change orders, coordinate works and make decisions pertaining to the fulfilling of the contract.
 5. All coating and painting equipment to be suitable for each specific material being applied and kept in first class working condition at all times.
 - a. Compressors to have suitable traps and filters installed.
 - b. All equipment to be subject to ENGINEER'S and/or paint manufacturer's approval.
- B. Surface Preparation:
1. Evaluated as compared with SSPC-VIS 1 (ASTM D220) and SSPC-VIS 2 (ASTM D610).

2. Surfaces with grease to be hot-detergent washed and rinsed as necessary prior to sandblasting and/or painting.
3. Type-sandblasting test: standard metal plates of 8½" x 11".
4. Plates to be prepared for each type sandblasting specified.
5. Any material applied upon improperly prepared surfaces will be removed and redone to the satisfaction of the ENGINEER at the sole expense of the CONTRACTOR.

C. Environmental Conditions:

1. Coating shall only be performed if the environmental conditions are within the manufacturer's recommendations.

D. Inspection

1. Concrete, non-ferrous metal, and wood surfaces shall be dry film inspected per SSPC-PA2.
2. Concrete wet film thickness per manufacturer recommendation and to be confirmed with appropriate wet film thickness gage meeting ASTM D4414-Standard Practice for Measurement of Wet Film Thickness of Organic Coating by Notched Gages.
3. A visual inspection shall be made by CONTRACTOR and ENGINEER. Any deficiencies in the finished coating shall be marked and repaired by CONTRACTOR according to the procedures set forth herein.
4. Ferrous metal surfaces to be mechanically inspected in accordance with SPO 188.
5. Ferrous metals under service conditions A and C to be electrically inspected with approved wet sponge continuity detector.

E. Thickness and Holiday Checking

1. Thickness to be checked with a non-destructive, magnetic type gauge per SSPC – PA2.
2. Coating integrity of interior surfaces: Tested with an approved holiday detection unit per SPO 188.
3. Mark, repair, and retest all pinholes as recommended by the manufacturer.

4. In cases of dispute: ENGINEER'S properly calibrated instruments for thickness measurements shall predominate.

F. Acceptable Inspection Devices

1. Tinker-Razor Models: AP/W and AP-N
2. Tinker-Razor Model M-1 6/ ½ volt
3. Microtest units for dry-film thickness in accordance with SSPC – PA2.
4. Or ENGINEER'S approved equivalent
5. Inspection devices to be operated as recommended by the manufacturer.
6. Devices and calibration plates furnished by the Contractor to be certified by the Department of Commerce, National Bureau of Standards.
7. Devices to be supplied by CONTRACTOR or at no additional cost to OWNER and to be on project site whenever coatings are being applied.

1.06 DELIVERY AND HANDLING

- A. All materials to be brought to the site in the original sealed containers.
- B. Containers to be open or used only after ENGINEER'S inspection for contents.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of quality. Equivalent materials of other manufacturer's may be submitted on written approval of the ENGINEER. As part of the proof of equality, the ENGINEER will require at the cost of the CONTRACTOR, certified test reports from a nationally known, reputable and independent testing laboratory conducting comparative tests as directed by the ENGINEER between the product specified and the requested substitution.
- B. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products

specified herein. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

- C. All requests for product substitution shall be made at least 10 days prior to the bid date.
- D. Manufacturer's color charts shall be submitted to the ENGINEER at least 30 days prior to coating and/or paint application. CONTRACTOR and Painting Contractor shall coordinate work so as to allow sufficient time (normally seven to ten days) for paint to be delivered to the job site.

2.02 SERVICE CONDITIONS

- A. Service Condition A: Ferrous metals buried (valves, flanges, bolts, nuts, structural steel and fittings) or subject to corrosive moisture, atmosphere or condensation.
 - 1. Surface preparation: near-white sand blasted according to SSPC-SP10
 - 2. Prime Coat: Tnemec Series 90-97 Tneme-Zinc to be applied at 2.5 to 3.5 dry mils.
 - 3. Intermediate Coat: Tnemec Series N69 to be applied at 4.0 to 6.0 dry mils.
 - 4. Finish Coat: Tnemec Series N69 applied at 4.0 to 6.0 dry mils.
 - 5. Total minimum dry film thickness shall be 10.5 mils.
- B. Service Condition B: Ferrous metals not subject to corrosive moisture or atmosphere and condensation, normal indoor or outdoor exposure.
 - 1. Surface preparation
 - a. Rid surfaces of dirt, dust, grease or other foreign matter. SSPC-SP6 Commercial Blast Cleaning.
 - b. Damaged shop coatings: Touch up with Tnemec Series 27WB Typoxy
 - c. Surfaces without shop coatings: Power tool clean as in SSPC-SP3
 - 2. Prime Coat: Tnemec Series N69 Hi-Build Epoxoline II at 4.0 to 6.0 dry mils
 - 3. Finish Coat: Tnemec Series 290 CRU at 2.0-3.0 dry mils
- C. Service Condition C: Ferrous metals subject to high temperature exposure.

1. Surface preparation: Sandblasting in conformance with SSPC-SP10 (near white metal)
 2. Coating: Tnemec Series 90-E92 Tneme-Zinc at 2.5 to 3.5 mils
- D. Service Condition D: Applied to non-ferrous or galvanized metals
1. Surface Preparation: shall be in accordance with SSPC SP-16.
 2. Prime Coat: Tnemec Series N69 Hi-Build Epoxoline II at 3.0 to 5.0 dry mils
 3. Finish Coat: Tnemec Series 1074 at 3.0 to 5.0 dry mils
- E. Service Condition E: Applied to all moving, submerged parts where resistance to sewage chemicals is required and drying coatings cannot obtain bond or effective film thickness. For parts such as cables, chains, gears, pulleys, etc.
1. Surface preparation: Hand tool cleaning in conformance with SSPC-SP2
 2. Coating: Inert grease coating as recommended by the manufacturer and approved by the ENGINEER.
- F. Service Condition F: Applied to concrete subject to submersion in corrosive liquid.
1. Surface Preparation - Allow new concrete to cure 28 days. Level protrusions and mortar spatter. Abrasive blast as per SSPC-SP13/NACE 6 for "Severe Service", achieving a surface profile equal to ICRI CSP 5. Fill voids and bugholes with epoxy modified cementitious mortar. Perform moisture testing per ASTM D 4263

Tnemec Series 218 MortarClad
 2. Prime Coat: Tnemec Series 218 MortarClad
 3. Chemical Resistant Liner: Tnemec Series 436 Perma-Shield FR at 80 to 100 dry mils
 4. Top Coat: Tnemec Series 435 Perma-Glaze at 15 to 20 dry mils
- G. Service Condition G: Applied to exterior concrete and masonry surfaces of all structures except buildings or where otherwise noted.
1. Surface preparation: The same as Service Condition H
 2. Prime Coat: Tnemec Series 156 Enviro-Crete at 6.0 to 8.0 dry mils

3. Finish Coat: Tnemec Series 156 Enviro-Crete at 6.0 to 8.0 dry mils
- H. Service Condition H: Non-slip coatings for concrete slabs.
1. Surface Preparation: Same as for service condition H.
 2. Prime Coat: Tnemec Series 201 Epoxoprime at 10.0 to 12.0 dry mils
 3. Intermediate Coat: Tnemec Series 282 Tnemec-Glaze at 8.0 to 10.0 dry mils
 4. Finish Coat: Tnemec Series 290 CRU with broadcast aluminum-oxide at 2.0 to 3.0 dry mils
- I. Service Condition I: For exterior, below grade concrete surfaces requiring a damp-proof barrier to moisture.
1. Surface Preparation: As recommended by manufacturer of the coating being used.
 2. Prime Coat: Tnemecol Series 46-465 H.B. Temecula at 8.0 to 10.0 dry mils.
 3. Finish Coat: Tnemecol Series 46-465 H.B. Temecula at 8.0 to 10.0 dry mils.
- J. Service Condition J: To be applied on exterior concrete and masonry requiring a clear water repellent sealant. Sealant shall serve as an Anti-Graffiti Coating.
1. Surface preparation: As recommended by manufacturer of the coating being used
 2. Prime Coat: Tnemec Series 626 Dura A Pell GS at a rate as follows:

Concrete:	200 to 300 square feet per gallon
CMU:	65-85 square feet per gallon
Brick:	125 to 150 square feet per gallon
 3. Perform water penetration test per ASTM E 514 to verify sealant performance.

2.03 MAINTENANCE MATERIALS

- A. All unused single component paint and coatings in partially used containers remaining from work.

- B. Not less than 1% of all single component paint and coatings used in work; resealed partially used containers can be used to meet this requirement.

PART 3 - EXECUTION

3.01 GENERAL

- A. Surface preparations completed on any particular item shall be inspected by NACE certified inspectors prior to primer application.
- B. Prior to final and unchangeable assembly, all surfaces shall be finished to the full satisfaction of the ENGINEER.

3.02 SURFACE PREPARATION

- A. Surface preparation specifications to be considered as stated in service conditions.
- B. Maximum abrasive particle size in sandblasting: To produce a height profile as recommended by the manufacturer of the protective coating to be applied.
- C. Field blast cleaning for all surfaces: Dry sandblasting method unless otherwise directed.
- D. Existing or finished coatings to be protected from sandblasting at all times.
 - 1. Prior to application of coatings: Dry clean sandblasted surfaces.
 - 2. Prior to abrasive blasting all welds shall be in accordance with SPO 178.

3.03 APPLICATION

- A. All material to be applied per manufacturer's recommendation, unless otherwise approved by the ENGINEER.
- B. Each application of paint or coating to be:
 - 1. Applied at the proper consistency and brushed evenly
 - 2. Free of brush marks, sags, runs or evidence of poor workmanship
 - 3. Avoid lapping on glass or hardware
 - 4. Finished surfaces shall be free from defects of blemishes.
 - 5. All stripe coat applications must be by brush.

- C. Use protective coverings or drop cloths for floors, piping, fixtures, and equipment.
- D. Whenever two coats of a dark colored paint or coating are specified:
 - 1. The first coat shall contain sufficient powdered aluminum as an indicator of proper coverage, or
 - 2. The two coats must be of contrasting color.
- E. All welds and irregular surfaces shall receive a brush coat prior to application of the first complete specified coat.
- F. Thickness per manufacturer recommendation.

3.04 SCHEDULE

- A. Interior Piping within Vaults and Above Grade
 - 1. Potable Water (Discharge Piping):
 - a. Service Condition: A
 - b. Color: Light Blue (RAL 5012)
 - c. Excluding Shop Applied Fusion Bonded Epoxy Coated Pipe
 - 2. Potable Water (Suction Piping):
 - a. Service Condition: A
 - b. Color: Green (match color to “Aged Copper” by Tiger Drylac)
 - c. Excluding shop applied Fusion Bonded Epoxy Coated Pipe
 - 3. Waste / Sump Piping
 - a. Service Condition: A
 - b. Color: Brown
- E. Safety Features
 - 1. Bollards / Post
 - a. Service Condition: A
 - b. Color: Safety Yellow

- F. Pipe Labels (to be applied to all process piping).
 - 1. Refer to Specification Section 015010 for additional information:
 - a. Polyester
 - b. White with black text
 - c. Directional arrow bands

END OF SECTION

SECTION 09961
FUSION BONDED EPOXY LININGS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section includes materials, application, and testing of one part, fusion bonded, heat cured, thermosetting, 100% solids epoxy linings and coatings on steel, cast iron and ductile iron equipment, such as valves, flexible pipe couplings, slide gates, and steel pipe.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Specification Section 09901: Painting and Coatings

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the Specification Section 01300: Contractor's Submittals.
- B. Submit manufacturer's catalog literature and product data sheets, describing the physical and chemical properties of the epoxy coating. Describe application and curing procedure.
- C. Submit coating application test records for measuring coating thickness and holiday detection for each item or pipe section and fitting. Describe repair procedures used.

1.04 MEASUREMENT AND PAYMENT

Costs for the work in this section shall not be paid for separately, but shall be considered incidental to the contract work to be accomplished.

PART 2 - PRODUCTS

2.01 PIPING AND EQUIPMENT SURFACES

- A. The Contractor shall require the equipment suppliers to provide equipment that is free of salts, oil, and grease to the coating applicator.
- B. The contractor shall require pipe suppliers to provide bare pipe that is free of salts, oil, and grease to the coating applicator.

2.02 SHOP-APPLIED EPOXY LINING AND COATING

Lining and coating shall be a 100% solids, thermosetting, fusion bonded, dry powder epoxy resin: Scotchkote 134 or 206N, Lilly Powder Coatings "Pipeclad

1500 Red,” H. B. Fuller 1f-3003, or equal. Epoxy lining and coating shall meet or exceed the following requirements:

Hardness (minimum)	Barcol 17 (ASTM D 2583) Rockwell 50 (“M” Scale)
Abrasion Resistance (maximum value)	1,000 cycles: 0.05 gram removed 5,000 cycles: 0.115 gram removed ASTM D 1044, Tabor CS 17 Wheel, 1,000-gram weight
Tensile Strength	7,300 psi (ASTM D 2370)
Penetration	0 mil (ASTM G17)
Adhesion Overlap Shear, 1/8 inch Steel panel, 0.010 Glue line	4,300 psi, ASTM D 1002
Impact (minimum Value)	100 inch-pounds (Gardner 5/8-inch diameter tup)

2.03 FIELD-APPLIED EPOXY COATING FOR PATCHING

Line and coat couplings the same as pipe. Color shall match the color of the pipe fusion epoxy coating.

PART 3 - EXECUTION

3.01 SHOP APPLICATION OF FUSION-BONDED EPOXY LININGS AND COATING GENERAL

- A. Grind surface irregularities, welds, and weld splatter smooth before applying the epoxy. The allowable grind area shall not exceed 0.25 square foot per location, and the maximum total grind area shall not exceed 1 square foot per item or piece of equipment. Do not use any item, pipe or piece of equipment in which these requirements cannot be met
- B. Remove surface imperfections, such as slivers, scales, burrs, weld spatter, and gouges. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of ¼ inch.
- C. Uniformly preheat the pipe, item, or piece of equipment prior to blast cleaning to remove moisture from the surface. The preheat shall be sufficient to ensure that the surface temperature is at least 5 degrees F above the dew point temperature during blast cleaning and inspection.

- D. Sandblast surfaces per SSPC SP-5. Protect beveled pipe ends from the abrasive blast cleaning.
- E. After cleaning and surface penetration, test the surface for residual chloride concentration. If the residual chloride concentration exceeds 5 µg/cm², then apply a phosphoric acid wash to the surface after sandblasting. Apply a phosphoric acid wash to the pipe, item, or piece of equipment after sandblasting. The average temperature measured in three different locations, shall be 80 degrees F to 130 degrees F during the acid wash procedure. The acid wash shall be 5% by weight phosphoric acid solution. The duration in which the acid is in contact with the surface shall be determined by using the average temperature as tabulated below:

SURFACE TEMPERATURE (°f)	CONTACT TIME (SECONDS)
80	52
85	45
90	36
95	33
100	28
105	24
110	21
130	10

After the acid wash has been completed, remove the acid with demineralized water having a maximum conductivity of 5 micromhos/cm at a minimum nozzle pressure of 2,500 psi.

- F. Apply lining and coating by the electrostatic spray or fluidized bed process. Minimum thickness of lining or coating shall be 15 mils. Heat and cure per the epoxy manufacturer’s recommendations. The heat source shall not leave a residue or contaminant on the metal surface. Do not allow oxidation of surfaces to occur prior to coating. Do not permit surfaces to flash rust before coating.

3.02 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO PIPE—ADDITIONAL REQUIREMENTS

- A. Apply lining and coating per AWWA C213 except as modified herein.

- B. Grind 0.020 inch (minimum) off the weld caps on the pipe weld seams before beginning the surface preparation and heating of the pipe.

3.03 QUALITY OF LINING AND COATING APPLICATIONS

- A. The cured lining or coating shall be smooth and glossy, with no graininess or roughness.
- B. The lining or coating shall have no blisters, cracks, bubbles, under fill voids, mechanical damage, discontinuities, or holidays.

3.04 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

- A. Test linings and coatings with a low-voltage wet sponge holiday detector.
 - 1. Test pipe linings and coatings per AWWA C213, Section 5.3.3.
 - a. If the number of holidays or pinholes is fewer than one per 20 square feet of coating surface, repair the holidays and pinholes by applying the coating manufacturer's recommended patching compound to each holiday or pinhole and retest.
 - b. If the number of pinholes and holidays exceeds one per 20 square feet of coating surface, remove the entire lining or coating and recoat the item or pipe.
- B. Measure the coating thickness at three locations on each item or piece of equipment or pipe section using a coating thickness gauge calibrate at least once per eight-hour shift.
 - 1. Record each measured thickness values are less than the specified minimum thickness, measure the coating thickness at three additional points around the defective area.
 - 2. The average of these measurements shall exceed the specified minimum thickness value, and no individual thickness value shall be more than 2 mils below the specified minimum value.
 - 3. If a section of the pipe, item, or piece of equipment does not meet these criteria, remove the entire lining or coating and recoat the entire item or piece of equipment.

3.05 FIELD REPAIRS

- A. Patch scratches and damaged areas incurred while installing fusion bonded epoxy coated items with a two component, 80% solids (minimum), liquid epoxy resin.
- B. Wire brush or sandblast the damaged areas per SSPC SP-10.

- C. Lightly abrade or sandblast the coating or lining on the sides of the damages area before applying the liquid epoxy coating.
- D. Apply a two-part epoxy coating to defective linings and coatings to areas smaller than 20 square inches.
- E. Patched areas shall overlap the parent or base coating a minimum of 0.5 inch.
- F. If a defective area exceeds 20 square inches, remove the entire lining and coating and recoat the entire pipe, item or piece of equipment.
- G. Apply the liquid epoxy coating to a minimum dry-film thickness of 15 mils.

END OF SECTION

SECTION 15050
GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the general requirements for selecting piping materials; selecting the associated bolts, nuts, and gaskets for flanges for the various piping services in the project; and miscellaneous piping items.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with Specification Section 01300: CONTRACTOR SUBMITTALS.
- B. Submit affidavit of compliance with referenced standards (e.g., AWWA, ANSI, ASTM, etc.).
- C. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. For materials originating outside of the United States, provide recertification by an independent domestic testing laboratory.
- D. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.
- E. Submit manufacturer's data sheet for insulating unions, showing recommended installation procedures.

1.03 DEFINITIONS OF BURIED AND EXPOSED PIPING

- A. Buried piping is piping buried in the soil, commencing at the wall or beneath the slab of a structure. Where a coating is specified, provide the coating up to the structure wall. Do not coat buried piping encased in concrete.
- B. Exposed piping is piping in any of the following conditions or locations:
 - 1. Above ground.
 - 2. Inside buildings, vaults, or other structures.
 - 3. In underground concrete trenches or galleries.

1.04 DEFAULT PIPING MATERIALS

If no material is shown in the drawings, use the following piping materials:

Service	Size Range (inches)	Material	Specification Section
Buried	3 and smaller	Copper-Type K	802
	4	PVC (AWWA C900)	801
	6 and larger	DIP or CML & C Steel	15263
Exposed	3 and smaller	Stainless Steel	802
	4	DIP	801
	6 and larger	CML Painted steel	09901 & 15263

1.05 MEASUREMENT AND PAYMENT

Payment for the work in this section shall not be paid for separately but shall be included as part of the several unit prices and or lump sum amounts to which the work pertains to as stated in the Bid Proposal and no additional compensation will be made therefore.

PART 2 - MATERIALS

2.01 MATERIALS SELECTION AND ALTERNATIVE MATERIALS

The drawings may show alternative piping materials for certain services. In such cases, the same pipe material shall be used for all pipe sizes in all locations for the given piping service. Do not intermix piping materials.

2.02 THREAD FORMING FOR STAINLESS STEEL BOLTS

Form threads by means of rolling, not cutting or grinding.

2.03 BOLTS AND NUTS FOR FLANGES FOR STEEL AND DUCTILE IRON PIPING

- A. Bolts and nuts for Class 150 flanges (including AWWA C207, Class D) located indoors and in vaults and structures shall be carbon steel, ASTM A 307, Grade B.
- B. Bolts and nuts for buried or submerged Class 150 flanges shall be Type 304 stainless steel conforming to ASTM A 193 (Grade B8) for bolts and ASTM A 194 (Grade 8) for nuts.
- C. Hex head machine bolts for use with lugged valves shall comply with ASTM A 193, Grade B7.
- D. Fit shall be Classes 2A or 2B per ANSI B1.1 when connecting to cast-iron valves having body bolt holes.

- E. Bolts for AWWA C207 Classes E and F flanges and ANSI B16.5 and B16.47 Class 300 flanges located indoors, and in vaults and structures shall be chrome molybdenum conforming to ASTM A 193, Grade B7, with nuts conforming to ASTM A 194, Grade 2H.
- F. Bolts and nuts for buried or submerged Class 300 flanges and Class 300 flanges shall be Type 304 stainless steel conforming to ASTM A 193, Grade 8, Class 2, for bolts and ASTM A 194, Grade 8 for nuts.
- G. Bolts used in flange insulation kits shall conform to ASTM A 193 (Grade B8). Nuts shall conform to ASTM A 194 (Grade 8).
- H. Provide washers for each nut and bolt. Washers shall be of the same material as the nuts.

2.04 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

Lubricant shall be chloride free and shall be TRX-Synlube by Ramco, Anti-Seize by Ramco, Husk-It Husky Lube O'Seal, or equal.

2.05 GASKETS FOR FLANGES FOR STEEL PIPING IN WATER SERVICE

- A. Gaskets for flat face and raised face flanges shall be 1/8-inch thick and shall be one of the following nonasbestos materials:
 1. Acrylic or aramid fiber bound with nitrile. Products: Garlock "Bluegard," Klinger "Klingersil C4400," or equal.
 2. Gaskets shall be suitable for a pressure of 500 psi at a temperature of 400°F.

2.06 GASKETS FOR FLANGES FOR DUCTILE-IRON PIPING AND FITTINGS IN WATER SERVICE

1. Gaskets shall be full face, 1/8-inch thick, cloth-inserted rubber, with a Shore "a" hardness of 75 to 85.
2. Gaskets shall be suitable for a water pressure of 200 psi at a temperature of 180°F.
3. Gaskets shall have "nominal" pipe size inside diameters not the inside diameters per ANSI B16.21.
4. Products: Garlock style 19 or equal.

2.07 THREADED CAPS FOR PROTECTION OF NUTS AND BOLT THREADS

1. Caps shall be high-density polyethylene, color gray.

2. The caps shall be filled with an anticorrosive lubricant to prevent nuts and bolts from rusting and corroding.
3. Lubricant shall be suitable for use in potable water.
4. Caps shall withstand temperatures from -40°F to 200°F.
5. Caps shall be suitable to use in exposed, buried, and submerged service conditions.
6. Products: Sap-Seal Products, Inc.; Advance Products and Systems, Inc., "Radolid"; or equal.

2.08 HEAT SHRINKABLE SLEEVES

Heat shrinkable sleeves when used shall comply with AWWA C216.

PART 3 - EXECUTION

3.01 INSTALLING PIPE SPOOLS IN CONCRETE

Install pipes spools in walls and slabs before placing concrete. See Specification Section 15125: WALL PIPES, SEEP RINGS AND PENETRATIONS.

3.02 RAISED FACE AND FLAT FACE FLANGES

The CONTRACTOR shall be responsible for verifying the mating flanges are of the same type.

3.03 INSTALLING ABOVEGROUND OR EXPOSED PIPING

Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.

3.04 INSTALLING FLANGED PIPING

- A. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline.
- B. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.
- C. Before bolting up, align flange faces to the design plane within 1/16 inch per foot measured across any diameter.
- D. Align flange boltholes within 1/8-inch maximum offset.
- E. Clean flanges by wire brushing before installing flanged fittings.

- F. Clean flange bolts and nuts by wire brushing, lubricate carbon steel bolts with oil and graphite, and tighten nuts uniformly and progressively.
- G. Bolt lengths shall extend completely through their nuts by at least one complete thread for complete engagement. Any which fail to do so shall be considered unacceptable.
- H. Do not use more than one gasket between contact faces in assembling a flanged joint.
- I. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints.
- J. Joints shall be watertight.
- K. Install threaded nut and bolt thread protection caps after completing the bolt, nut, and gasket installation as set forth herein. Install on buried and submerged piping.

3.05 INSTALLING BLIND FLANGES

- A. At outlets not indicated to be connected to valves or to other pipes and to complete the installed pipeline hydrostatic test, provide blind flanges with bolts, nuts, and gaskets.
- B. Coat the inside face of blind flanges per Specification Section 09901: PAINTING AND COATINGS, System 10.

3.06 INSTALLATION OF STAINLESS STEEL BOLTS AND NUTS

Prior to assembly, coat threaded portions of stainless steel bolts and nuts with lubricant as specified in Article 2.04 herein.

3.07 INSTALLING POLYURETHANE SEALANT FOR FLANGE INSULATION KITS IN PIPING 24 INCHES AND LARGER

Apply sealant into the gap between the two flanges inside the pipe. Apply sufficient sealant to fill the gap to the thickness of the pipe lining; trowel to provide a smooth and even layer between the two pieces of pipe.

END OF SECTION

SECTION 15103
FABRICATED HEADWALL SLIDE GATES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment, and incidentals to install fabricated slide gates, as specified.
- B. Slide gates shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete, properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of fabricated slide gates.

1.02 RELATED WORK

- A. Section 01300: Contractor Submittals
- B. Section 01600: Product Requirements
- C. Section 01730: Operation and Maintenance Data

1.03 REFERENCES

- A. Design, manufacturing, and assembly of elements of the equipment herein specified shall be accordance with the standards of the below listed organizations.
- B. Where reference is made to a standard of one of the following or other organizations, the version of the standard in effect at the time of the bid opening shall apply.
 - 1. American Water Works Association Standards
 - 2. ANSI Standards
 - 3. American Society for Testing and materials (ASTM)

1.04 SUBMITTALS

- A. Shop drawings and product data shall be submitted to the Engineer in accordance with Section 01300.

- B. Operation and Maintenance Manuals: Operation and Maintenance Manuals shall be submitted in accordance with Section 01730.
 - 1. Prior to start-up, Contractor shall provide complete operations and maintenance manuals in accordance with Section 01730.
 - 2. All manuals shall consist of drawings, vendor drawings, and all applicable instructions for the proper installation and operation of the equipment.
 - 3. The manuals shall be prepared specifically for this installation and shall include all cuts, drawings, parts lists, descriptions, etc.
- C. Pressure ratings established by hydrostatic tests per ANSI B16 1.

1.05 QUALITY ASSURANCE

- A. The manufacturer shall have experience in the production of similar equipment and shall show evidence of satisfactory operation in at least 50 installations.
- B. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of ASME, Section IX.
- C. Slide gates shall be shop inspected for proper operation before shipping.

PART 2 PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. HEADWALL CONTROL GATE ACCEPTABLE MANUFACTURERS

- 1. Waterman Valve C-20 Canal Gate OR Engineer-approved equal.
 - a. Low outlet gate height: (H) min. = 18.5 ft
 - b. High outlet gate height: (H) min. = 9.5 ft
 - c. RSE extensions will be required to meet height requirements listed in B and C.

2.02 DESIGN REQUIREMENTS AND CONSTRUCTION MATERIALS

A. Gate Types:

- 1. Frame embedded:
 - a. Self-contained rising stem.
 - b. Flush bottom spigot back for embedding in concrete.

2. Frame Surface Mounted:
 - a. Self-contained.
 - b. Rising stem.
 - c. Flush bottom.
 - d. Flat back for attaching to the front face of concrete.
- B. Material:
 1. Gate and frame: aluminum, ¼-inch maximum thickness or type 304 stainless steel.
 2. Stem: Type 303 or type 304 stainless steel.
- C. Gate frame: Integral unit of structural and/or extruded shapes assembled by welding to form waterway opening.
- D. Gate Guides:
 1. Extruded shapes to incorporate guide grooves for the slide and flat or spigot back part of frame.
 2. Guide extensions designed with rigidity as columns to take thrust developed during gate operation at maximum head.
- E. Slide:
 1. Plate-reinforced with structural shapes attached by welding.
 2. Reinforced to limit deflection under full head to not more than 1/360th of span.
 3. Stem connection attached by welding and designed to take full thrust.
- F. Flush Bottom Closure:
 1. Specially molded resilient seal with ¾-inch minimum width exposed face securely mounted on gate slide or securely attached to frame invert.
 2. Seal to extend into guide grooves and make contact with back side of groove to seal bottom corners.
- G. Watertight seal in closed position.
- H. Hardware and anchors: stainless steel furnished by gate manufacturer.
- I. Operator:

1. Handwheel operator, no gear reduction.
2. Lift nut: bronze, ASTM B584 (CA872)
3. Ball or roller bearings provided above and below flange on lift nut to take gate opening and closing thrust with a force of 100 ft-lbs. on handwheel.
4. Bearings enclosed in a housing; seals provided to prevent leakage of lubricant.
5. Fittings provided for periodic lubrication.
6. Maximum 50 ft-lbs required for lifting gate after unseating, maximum 95 lbs. force on handwheel.
7. Direction of opening indicated by cast letters and symbols on handwheel.
8. Crank operators where scheduled, as applicable; same requirements as given for handwheel operators, enclosed gears.

2.03 FACTORY ASSEMBLY

- A. Gates to be completely assembled prior to shipment to ensure proper fit and adjustment of all parts.

2.04 PROTECTION COATING

- A. Manufacturer's standard shop coating.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor is responsible for the good care and safe handling of all equipment.
- B. All parts shall be properly protected, and proper care should be provided so that no damage will occur from the time of shipment until installation is completed and the units and equipment are ready for operation.
- C. Each box or package shall be properly marked to show its net weight in addition to its contents.

3.02 INSTALLATION

- A. The equipment shall be installed in accordance with the manufacturer's written instructions, as indicated on Drawings, plumb, level, watertight, ready for use.

- B. All mountings, support, anchors and ancillary equipment shall be furnished for proper installation.
- C. The Contractor shall be responsible to coordinate all details of the equipment with other related part of the Work, including verification that all structures and equipment components are compatible.

3.03 SCHEDULE

- A. Number, size, and location as shown on the Drawings.

END OF SECTION

SECTION 15108

AIR-RELEASE AND VACUUM-RELIEF VALVES FOR WATER

PART 1 – GENERAL

1.01 DESCRIPTION

This Section of the specification shall be supplemental to Section 801 of the Standard Specifications and includes materials and installation of air and vacuum valves and air-release valves for water service.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Specification Section 15050: GENERAL PIPING REQUIREMENTS

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Specification Section 01300 - Contractor Submittals.
- B. Submit manufacturer's catalog data. Show dimensions, materials of construction by ASTM reference and grade, and coatings.

1.04 MEASUREMENT AND PAYMENT

Payment for the valves in this section shall not be paid for separately, but shall be included in the unit or lump sum amounts for each vault or manhole included in the Bid Proposal and no additional payment therefore will be made accordingly.

PART 2 – MATERIALS

2.01 COATING

- A. Valves shall have Fusion Bond Epoxy Coating, interior and exterior, AWWA C550. Epoxy powder certified to NSF-61. Do not coat stainless-steel pieces.

2.02 BOLTS AND NUTS FOR FLANGED VALVES

- A. See specification for the pipe to which the valve is attached.

2.03 GASKETS FOR FLANGED END VALVES

- A. Gaskets for flanged end valves shall be as described in Specification Section 15050: GENERAL PIPING REQUIREMENTS of these specifications.

2.04 VALVE DESIGN AND OPERATION

- A. Air-release valves for water service shall function to slowly release pockets of air which accumulate at high points in piping systems.
1. Valves larger than 3/4 inch shall have a float-actuated compound lever with linkage mechanism to release air.
 2. Float shall withstand an external pressure of 1,000 psig without collapsing.
 3. Air-release valves 2 inches in size shall incorporate a body with flanged top cover, screened mushroom-type cap outlet, and replaceable orifice and a synthetic rubber needle or disc actuated by the float and linkage mechanism.
 4. Top cover shall include a 1/2-inch threaded outlet with bronze plug.
 5. Body shall include a 1/2-inch threaded drain outlet near the bottom with a bronze plug.
- B. Air and vacuum valves for water service shall have a float assembly and large venting orifice to exhaust large quantities of air from pipelines when being filled and to admit large quantities of air when pipelines are being drained.
1. Valve shall have a body with a flanged top containing the air-release orifice.
 2. The float shall rise with the water level in the valve body to close the orifice by sealing against a synthetic rubber seat.
 3. Float shall be protected by a baffle to prevent premature closing and shall withstand an external pressure of 1,000 psig without collapsing.
 4. Do not use designs having levers and weights attached to the floats.
 5. Float shall have a one-piece guide rod extending out of the bottom end to engage the guide bushings in the valve body at all times.
- C. Air and vacuum valves larger than 4 inches shall have a 1-inch threaded drain outlet with bronze plug near the bottom of the valve body and a 2-inch threaded outlet with bronze plug on the side of the valve body above the minimum water level in the valve which forces the float against the valve seat. The valve outlet shall have a protective steel hood to prevent entry of foreign material.

2.05 MATERIALS AND CONSTRUCTION

- A. Materials of construction for air-release valves for water service shall be as follows:

<u>ITEM</u>	<u>MATERIAL</u>	<u>SPECIFICATION</u>
Body and cover	Cast Iron	ASTM A 126, Grade B
Float	Stainless steel	AISI Type 316, ASTM A 240 or A 276
Linkage, orifice air-release mechanism	Stainless steel	AISI Type 316, ASTM A 240 or A 276
Needle	Buna-N	--

- B. Materials of construction for air and vacuum valves for water service shall be as follows:

<u>ITEM</u>	<u>MATERIAL</u>	<u>SPECIFICATION</u>
Body and cover	Cast Iron	ASTM A 48, Class 30
Float, guide rod, guide bushings	Stainless steel	AISI Type 316, ASTM A 240 or A 276
Seat	Buna-N	--

2.06 VALVES

- A. AIR RELEASE VALVES, 2 INCHES AND SMALLER, CLASS 300:

Valves shall have an operating pressure of 300 psi. Orifice size shall be 5/32 inch or size indicated on plans. Valves shall be APCO 200, Val-Matic Model 38.6 or approved equal.

- B. COMBINATION AIR AND VACUUM VALVES, 2 Inches through 6 Inches, Class 300:

1. Valves shall have an operating pressure of 300 psi.
2. Provide steel hood above the top cover and orifice.
3. The valves shall be single body type with the air relief built into the valve.
4. 2" air and vacuum valve shall have a 1/16" orifice, or as identified on the plans.

The valves shall be APCO Series 143C to 151C, Val-Matic Models 201 through 208, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
- B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

3.02 VALVE PRESSURE TESTING

Test valves at the same time that the connecting pipelines are pressure tested. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure.

END OF SECTION

SECTION 15240
DUCTILE-IRON PIPE

PART 1 – GENERAL

1.01 DESCRIPTION

This section describes materials, testing, and installation of ductile-iron pipe and fittings 60 inches and smaller. This section shall be supplemental to Section 129 of the NMAPWA Standard Specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Specification Section 09901: PAINTING AND COATINGS.
- B. Specification Section 15050: GENERAL PIPING REQUIREMENTS.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Supplemental Specification Section 01300: Contractor Submittals.
- B. Provide an affidavit of compliance with standards referenced in this specification, e.g., AWWA C151. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153, Section 5.5, is met.
- C. Submit piping layout profile drawings showing location and dimensions of pipe and fittings; submit after equipment and valve submittals have been reviewed and marked "Resubmittal not required." Label or number each fitting or piece of pipe. Piping having identical design pressure class, laying lengths, and bell-and-spigot dimensions that is to be placed in long straight reaches of alignment may have the same identifying label or number.
- D. Provide the following information:
 - 1. Mortar lining thickness.
 - 2. Wall thickness.
 - 3. Material test data for this project.
 - 4. Show deflections at push-on and mechanical joints.
 - 5. Submit joint and fitting details and manufacturer's data sheets.
- E. Submit copy of manufacturer's quality control check of pipe material and production. Include hydrostatic test records and acceptance test records. For each acceptance test,

submit a stress-strain diagram showing yield strength, yield point, tensile strength, elongation, and reduction in area. Provide specimen test section dimensions and speed and method used to determine speed of testing, method used for rounding of test results, and reasons for replacement specimens, if any. Submit ring bending test of pipe of the same diameter and pressure class as the pipe required for this project to prove ring bending stress at 48 ksi results in a factor of safety of 2.0.

- F. Submit certificate that cement for mortar lining complies with ASTM C 150, designating type.
- G. Submit test report on physical properties of rubber compound used in the gaskets.
- H. Submit drawing or manufacturer's data sheet showing flange facing, including design of facing serrations.
- I. Submit weld procedure specification, procedure qualification record, and welder's qualifications prior to any welding to ductile-iron pipe.

PART 2 - MATERIALS

2.01 PIPE

- A. Pipe shall be cast ductile (nodular) iron, conforming to AWWA C151 and produced in the United States.
- B. Provide pipe in nominal 18- or 20-foot laying lengths.

2.02 PIPE MARKING

Plainly mark each length of straight pipe and each fitting at the bell end to identify the design pressure class, the ductile-iron wall thickness, and the date of manufacture, and the proper location of the pipe item by reference to the layout schedule. Mark the spigot end of restrained joint pipe to show clearly the required depth of insertion into the bell.

2.03 DESIGN CRITERIA

- A. Obtain the following information from the contract documents:
 - 1. Elevation of the top of pipe and of the completed ground.
 - 2. Alignment of the pipeline.
 - 3. Nominal internal diameter, ID.
 - 4. Joint types(s).

2.04 PIPE WALL THICKNESS

- A. Minimum wall thickness for pipe having push-on or mechanical joints, restrained joints or plain ends shall be Pressure Class 150, unless otherwise shown in the drawings.
- B. Minimum wall thickness for pipe having threaded flanges shall be Special Class 53 or Pressure Class 350.

2.05 FITTINGS

- A. Fittings 48 inches and smaller shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Fittings 54 inch and 60 inch pipe shall conform to AWWA C153 with a minimum pressure rating of 150 psi. Material shall be ductile iron, Grade 70-50-05 as specified in ASTM A536. Flanges shall be flat faced.
- B. Mechanical joint ductile-iron fittings 18 through 48 inches conforming to AWWA C110 (except for laying length) with a minimum pressure rating of 250 psi may also be used.

2.06 FLANGES

- A. Flanges shall be solid back, 250 psi working pressure per AWWA C115. Flanges on pipe shall be either cast or threaded. Material shall be ductile iron.
- B. Flanged pipe and fittings shall be shop fabricated, not field fabricated. Threaded flanges shall comply with AWWA C115. Flanges shall be individually fitted and machine tightened in the shop, then machined flat and perpendicular to the pipe barrel. Flanges shall be backfaced parallel to the face of flange. Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There shall be zero leakage through the threads at a hydrostatic test pressure of 250 psi without the use of the gasket.
- C. Material for blind flanges shall be ductile iron.

2.07 PIPE LINING--CEMENT MORTAR

- A. Line pipe interior and fittings with cement-mortar per AWWA C104. Lining thickness shall be the double thickness listed in AWWA C104, Section 4.7. Lining material shall conform to ASTM C 150, Type II.
- B. Line blind flanges per Specification Section 09901: PAINTING AND COATINGS, System No. 7.
- C. Maintain a moist environment inside the lined pipe and fittings by sealing the ends with polyethylene sheet.

- D. Loose areas of cement mortar lining are not acceptable. Remove and reconstruct lining in areas where quality is defective, such as sand pockets, voids over sanded areas, blisters, drummy areas, cracked areas, and thin spots. Longitudinal cracks in excess of 1/32 inch in width or where crack extends to metal shall be repaired with epoxy. Repair all cracks larger than 1/16 inch with epoxy.

2.08 GASKETS FOR FLANGES

See Specification Section 15050: GENERAL PIPING REQUIREMENTS.

2.09 GASKETS FOR MECHANICAL, PUSH-ON, AND RESTRAINED JOINTS

Synthetic rubber in accordance with AWWA C111.

2.10 BOLTS AND NUTS FOR FLANGES

See Specification Section 15050: GENERAL PIPING REQUIREMENTS.

2.11 JOINTS

- A. Joints in piping located in vaults and structures shall be flanged end as noted on the plans.
- B. Joints in buried piping shall be of the restrained, push-on or mechanical-joint type per AWWA C111 except where flanged joints are required to connect to valves, meters, and other equipment. Provide unrestrained buried joints except where restrained joints are specifically shown in the drawings.
- C. Restrained joints for piping 6 inches and larger shall be American Cast Iron Pipe "Lok-Ring" or "Flex-Ring," U.S. Pipe "TR-Flex," or equal. All weldments for restrained joints shall be tested by the liquid penetrant method per ASTM E 165. Restrained joints may also consist of mechanical joints with restraint system using follower ring and wedges.
- D. Restrained joints in 4-inch-diameter buried piping shall be American Cast Iron Pipe Company "Fast-Grip," U.S. Pipe Field-lok gasket within Tyton joint pipe and fittings, or equal. Joint restraint shall be certified to four times rated pressure of 200 psi by Factory Mutual.
- E. Provide thrust restraint as called for on the drawings.

2.12 MECHANICAL JOINT RESTRAINT SYSTEM USING FOLLOWER RING AND WEDGES

The restraining mechanism shall consist of a follower gland having a seal gasket and individually actuated wedges that increase their resistance to pullout as pressure or external forces increase. The system manufacturer shall provide all the components (follower ring, wedges, and gaskets) for the restraining device. The device shall be

capable of full mechanical joint deflection during assembly and the flexibility of the joint shall be maintained after burial. The joint restraint ring and its wedging components shall be constructed of ductile iron conforming to ASTM A 536, Grade 60-42-10. The wedges shall be ductile iron, heat-treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with mechanical joint bells conforming to AWWA C111 and AWWA C153. The design shall use torque limiting twist-off nuts to provide actuation of the restraining wedges. The mechanical joint restraint shall be available in the size range of 3 through 48 inches. Minimum rated pressure shall be 350 psi for sizes 16 inches and smaller and 150 psi in sizes 18 inches and larger. Products: Megalug Series 1100 as manufactured by EBAA Iron, Inc., or equal.

2.13 DUCTILE-IRON PIPE WELDMENTS

- A. All welding to ductile-iron pipe, such as for bosses, joint restraint, and joint bond cables, shall be done at the place of manufacture of the pipe. Perform welding by skilled welders who have experience in the method and materials to be used. Welders shall be qualified under the standard qualification procedures of the ASME Boiler and Pressure Vessel Code, Section IX, Welding Qualifications.
- B. Welds shall be of uniform composition, neat, smooth, full strength, and ductile. Completely grind out porosity and cracks, trapped welding flux, and other defects in the welds in such a manner that will permit proper and complete repair by welding.
- C. Completed welds shall be inspected at the place of manufacture by the liquid penetrant method. Conform to the requirements specified in ASTM E 165, Method A, Type I or Type II. The materials used shall be water washable and nonflammable.

PART 3 - EXECUTION

3.01 DELIVERY, UNLOADING, AND TEMPORARY STORAGE OF PIPE AT SITE

- A. Limit onsite pipe storage to a maximum of thirty days.
- B. Use unloading and installation procedures that avoid cracking of the lining. If necessary, use plastic sheet bulkheads to close pipe ends and keep cement-mortar lining moist.
- C. Deliver the pipe alongside the pipelaying access road over which the pipe trailer-tractors can travel under their own power. Place the pipe in the order in which it is to be installed and secure it from rolling.
- D. Do not move pipe by inserting any devices or pieces of equipment into the pipe barrel. Field repair linings damaged by unloading or installation procedures.

3.02 SANITATION OF PIPE INTERIOR

- A. During laying operations, do not place tools, clothing, or other materials in the pipe.
- B. When pipelaying is not in progress, close the ends of the installed pipe by a child- and vermin-proof plug.

3.03 INSTALLING FLANGED PIPE AND FITTINGS

Install in accordance with Specification Section 15050: GENERAL PIPING REQUIREMENTS. Cut the bore of the gaskets such that the gaskets do not protrude into the pipe when the flange bolts are tightened.

3.04 INSTALLING GROOVED-END PIPE AND FITTINGS

See Specification Section 15050: GENERAL PIPING REQUIREMENTS.

3.05 INSTALLING BURIED PIPING

- A. Install in accordance with NMAPWA Specification Section 701: TRENCHING, EXCAVATION AND BACKFILL and as follows.
- B. When installing piping in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.
- C. Assemble restrained joints per manufacturer's instructions.

3.06 JOINT DEFLECTIONS FOR BURIED PIPE

- A. Do not exceed the following deflection angles for unrestrained buried pipe joints:

Pipe Size (inches)	Maximum Deflection (degrees)	
	Push-On Joint	Mechanical Joint
16	2-1/2	3
24	2-1/2	2

- B. For restrained joints, do not exceed 80% of the manufacturer's recommended maximum deflections.
- C. Small angular changes (less than 7 degrees) in horizontal alignment defined in the drawings by a point of inflection (PI) with no accompanying curve data shall be approximated as a curve by deflecting by equal amounts equal length pipe segments to create a curve equally distributed on both sides of the given PI. Accomplish a larger (greater than or equal to 7 degrees) change in horizontal alignment where a curve is not called for in the drawings through the use of an elbow placed at the station of the PI shown in the drawings. Provide thrust restraint as required in the drawings.

- D. Small angular changes (less than 5 degrees) in vertical alignment may be accomplished by the use of pulled joints. For larger vertical deflections, place an elbow at the station and elevation of the vertical PI shown in the drawings. Provide thrust restraint as required in the drawings.
- E. Assemble joints in accordance with AWWA C600 and the manufacturer's recommendations.

3.07 INSTALLING ABOVEGROUND OR EXPOSED PIPING

See Specification Section 15050: GENERAL PIPING REQUIREMENTS.

3.08 PAINTING AND COATING

- A. Provide asphaltic coating on buried pipe per AWWA C151.
- B. Coat buried flanges and buried mechanical and restrained joint bolts, nuts, and glands per Specification Section 09901: PAINTING AND COATINGS, System No. 21.
- C. Coat pipe located aboveground and vaults or structures per Specification Section 09901: PAINTING AND COATINGS, System 10. Apply prime coat in shop before transporting pipe to job site. Apply intermediate and finish coats in field before installing the pipe, then touch up after installation.

3.09 CLEANING PIPE

Sweep pipe clean of all dirt and debris. If hardened mud exists in the pipe, remove with the use of pressurized water hoses.

3.10 HYDROSTATIC TESTING

Test in accordance with NMPWA Section 801. Test pressure shall be 150 psi or based on the test pressure HGL identified in the plans.

PART 4 – PAYMENT

Payment for the work in this section shall not be paid for separately but shall be included as part of the unit price cost for piping. No additional compensation will be made.

END OF SECTION

SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes general administrative and procedural requirements of electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Submittals
 - 2. Coordination Drawings
 - 3. Record Documents
 - 4. Maintenance Manuals
 - 5. Rough-Ins
 - 6. Electrical Installations
 - 7. Cutting and Patching

1.02 RELATED WORK

- A. Drawings and general provisions of Contract, including General Conditions, Supplementary Conditions, and Division 1 Specification Sections apply to all Sections of Division 16.
- B. The requirements listed under General Conditions and Supplementary Conditions and the General Requirements are applicable to this section and all subsequent sections of Division 16 and form a part of the contract.
- C. Section 02221: Trenching, Backfilling and Compacting.
- D. See Division 1, Coordination for additional requirements.
- E. See Division 1, Cutting and Patching for additional requirements.
- F. See Division 11.
- G. See Division 13.
- H. See Division 15.
- I. Section 01340: Shop Drawings, Product Data and Samples.

1.03 CODES AND PERMITS

- A. Perform electrical work in strict accordance with the applicable provisions of the National Electrical Code, Latest Edition; National Electric Safety Code, Latest Edition; the Uniform Building Code, Latest Edition as adopted and interpreted by the State of New Mexico, and the National Fire Protection Association (NFPA Regulations), current adopted edition. Provide all materials and labor necessary to comply with rules, regulations and ordinances. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern. The Contractor shall hold and save the Engineer free and harmless from liability of any nature or kind arising from his failure to comply with codes and ordinances.
- B. Secure and pay for all permits necessary for performance of the work. Pay for all utility connections unless otherwise specified herein.
- C. The following lists applicable codes and standards that, as a minimum, shall be followed.
 - 1. Applicable county and state electrical codes, laws and ordinances.
 - 2. National Electrical Manufacturer's Association Standards.
 - 3. National Electrical Code.
 - 4. National Electrical Safety Code.
 - 5. Underwriters Laboratories, Inc. Standards.
 - 6. American National Standards Institute.
 - 7. American Society for Testing Materials Standards.
 - 8. Standards and requirements of local utility companies.
 - 9. National Fire Protection Association Standards.
 - 10. Institute of Electrical and Electronics Engineers Standards
 - 11. Insulated Cable Engineers Association
 - 12. Occupational Safety and Health Act.
 - 13. Uniform Fire Code.
 - 14. Americans with Disabilities Act
 - 15. Commercial and Industrial Insulation Standards (MICA).

1.04 RECORD DRAWINGS

- A. See Division 1, for requirements associated with Project Record Drawings.
- B. Maintain a complete and accurate set of marked up blue-line prints showing information on the installed location and arrangement of all electrical work, and in particular, where changes were made during construction. Keep record drawings accurate and up-to-date throughout the construction period. Record drawings may be reviewed and checked by the Engineer during the construction and in conjunction with review and approval of monthly pay requests. Include copies of all addenda, RFI's, bulletins, and change orders neatly taped or attached

to record drawing set. Transmit drawings to the Engineer at the conclusion of the project for delivery to the Owner's representative.

- C. Prepare record documents in accordance with the requirements in Division 1, Section 01700: Contract Closeout. In addition to the requirements specified in Division 1, indicate installed conditions for:
 - 1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.05 QUALIFICATIONS

- A. All electricians shall be skilled in their respective trade.

1.06 SUBSTITUTIONS

- A. Identification of Division 16 equipment, fixtures, and materials listed within this Specification and in the Equipment Schedules on the drawings, which are identified by manufacturer's name, trade name, and/or model numbers are generally not meant to give preference to any manufacturer, but are provided to establish the design requirements and standards. Additional manufacturers judged to be "equivalent" to the specified product may also be listed.
- B. Equipment submitted for substitution must fit the space conditions leaving adequate room for maintenance around all equipment. A minimum of 36 inches, or more if required by Code, must be maintained clear in front of all electrical panels, starters, gutters, or other electrical apparatus. Submit drawings showing the layout, size and exact method of interconnection of conduit, wiring and controls, which shall conform to the manufacturer's recommendations and these specifications. The scale of these drawings shall be scale of Contract Drawings. The Contractor shall bear the excess costs, by any and all crafts, of fitting the equipment into the space and the system designated. Where additional labor or material is required to permit equipment submitted for substitution to function in an approved manner, this shall be furnished and installed by the Contractor without additional cost to the Owner.
- C. Equipment submitted for substitution shall be approved in writing by the Owner or his representative and shall be accompanied by the following:
 - 1. A sample of each item submitted for substitution shall accompany the submittal.

2. Provide a unit price quotation with each item intended for substitution. Include a unit price for the specified item and a unit price for the intended substitute item. Provide a total (per item) of the differential payback to the Owner should the intended substitute item be equivalent to that which is specified.
- D. Substitutions shall be approved in writing by the Owner or his representatives. The determination of the Owner shall be final.

1.07 PRIOR APPROVAL

- A. Requests for prior approval received after the specified due date may not be considered.
- B. Division 16 prior approval equipment, fixtures, and materials which are submitted as specified herein and accepted will be included in an Addendum. Equipment, fixtures and materials which are accepted under this prior approval process are accepted for bidding purposes only, subject to all requirements, terms, and conditions of the Contract Documents.

1.08 DEFINITIONS

- A. Definitions of terms will be found in the National Electric Code, Electrical Safety Orders.
- B. Whenever a term is used in this Specification which is defined in the Code, the definition given will govern its meaning in this Specification.
- C. Whenever a technical term is used which does not appear in the Code, the definition to govern its meaning in these Specifications will be found in the Standard Dictionary of Electrical and Electronic Terms, published by the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, New Jersey 08855-1331.
- D. "Provide" means furnish, install, connect and test unless otherwise noted.
- E. Wet Interior Locations: Underground or below grade structure locations subject to submergence or which contain water/liquid piping with the possibility for submergence.
- F. Dry Interior Locations: All interior locations not defined as "Wet Interior Locations."
- G. Damp Exterior Locations: All locations beneath a protective roof structure preventing direct rain exposure, but does not have protective walls preventing indirect exposure.

- H. Wet Exterior Locations: All locations exterior to buildings not under a protective roof structure and directly exposed to rain.
- I. Corrosive Locations: Locations defined by Engineer to have a corrosive atmosphere due to gases or liquids.
- J. Hazardous Locations: Areas considered to be classified as Class 1, Division 1 or 2 as defined in the NEC (NFPA 70, most current edition).
- K. Voltage Classes: System voltages referenced as “Low Voltage”, “Medium Voltage” and “High Voltage” shall be defined as identified in ANSI C84.1-2011.3 “System voltage classes”.

1.09 SUBMITTALS

- A. The Contractor shall submit to the Engineer submittal brochures of equipment, fixtures and materials to be furnished under Division 16 as indicated in Section 01340.
- B. Unauthorized Substitutions: If substitute materials, equipment or systems are installed without prior review or are installed in a manner which is not in conformance with the requirement of this Specification and for which the Contractor has not received a written review, removal of the unauthorized materials and installation of those indicated or specified shall be provided at no change in contract amount.
- C. Install equipment in accordance with the manufacturer's recommendations. Provide accessories and components for optimum operation as recommended by the manufacturer.
- D. Costs for the preparation, correction, delivery, and return of the submittals shall be borne by the Contractor.
- E. Complete data must be furnished showing performance, quality and dimensions. No equipment or materials shall be purchased prior to receiving written notification from the Engineer that submittals have been reviewed and marked either "NO EXCEPTIONS TAKEN" or "EXCEPTIONS AS NOTED". Submittals returned marked "EXCEPTIONS AS NOTED" do not require resubmittal provided that the Contractor agrees to comply with all exceptions noted in the submittal, and so states in a letter to the Engineer.
- F. Review of Submittals: Submittals will be reviewed with reasonable promptness, but only for conformance with the design concept of the Project and for conformance with the information indicated on the Drawings and stated in the Specifications. Review of a separate item as such will not indicate review of the assembly in which the item functions. Review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the

Contract Documents, nor for errors or omissions in the submittals; or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning and completion of the work. Review shall not relieve the Contractor of responsibility for the equipment fitting within the allotted space shown on the drawings with all clearances required for equipment operation, service and maintenance including a minimum of 3 feet clear in front of all electrical equipment and panels as defined by the National Electric Code. Any relocation of mechanical and/or electrical equipment, materials and systems required to comply with minimum clearances shall be provided by the Contractor without additional cost under the Contract.

- G. Shop Drawings: Unless the following information is included, shop drawings will be returned unchecked:
1. Cover sheet for each submittal, listing equipment, products, and materials, and referencing data and sections in Specifications and drawings. Clearly reference project name and provide space for a review stamp.
 2. Cover sheet shall clearly identify deviations from specifications, and justification.
 3. Include all related equipment in a single submittal to allow complete review. Similar equipment may be submitted under a common cover sheet.
 4. Size, dimensions, and weight of equipment.
 5. Equipment performance under specified conditions, not a copy of scheduled data on drawings.
 6. Indicate actual equipment proposed, where data sheets indicate more than one (1) device or equipment.
- H. Use of substitutions reviewed and checked by the Engineer does not relieve the Contractor from compliance with the Contract Documents. Contractor shall bear all extra expense resulting from the use of any substitutions where substitutions affect adjoining or related work required in this Division or other Divisions of this Specification.
- I. If Contractor substitutes equipment for that drawn to scale on the drawings, he shall prepare a 1/4" = 1' 0" installation drawing for each equipment room where a substitution is made, using dimensions of substituted equipment, and including piping, and electrical equipment requirements, to verify that equipment will fit space with adequate clearances for maintenance. This 1/4" = 1' 0" fabrication drawing shall be submitted, for review by the Engineer, with the shop drawing submittals of the substituted. Failure to comply with this requirement will result in the shop drawings being returned unchecked.

1.10 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1, Section 01730 Contract Closeout. In addition to the requirements specified in Division 1, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Servicing instructions and lubrication charts and schedules.

1.11 DRAWINGS AND SPECIFICATIONS

- A. Electrical drawings are diagrammatic, but shall be followed as closely as actual construction and work of the other sections shall permit. Size and location of equipment is drawn to scale wherever possible. Do not scale from electrical drawings.
- B. Drawings and specifications are for the assistance and guidance of the Contractor. Exact locations, distances, and levels will be governed by the building. The Contractor shall make use of data in all the Contract Documents to verify information at the building site.
- C. In any case where there appears to be a conflict between that which is shown on the electrical drawings, and that shown in any other part of the Contract Documents, the Contractor shall notify and secure directions from the Engineer.
- D. Drawings and specifications are intended to complement each other. Where a conflict exists between the requirements of the drawings and/or the specifications, request clarification. Do not proceed with work without direction.
- E. The Engineer shall interpret the drawings and the specifications. The Engineer's interpretation as to the true intent and meaning thereof and the quality, quantity, and sufficiency of the materials and workmanship furnished thereunder shall be accepted as final and conclusive.
- F. Where items are specified in the singular, this division shall provide the quantity as shown on drawings plus any spares or extras indicated on the drawings or in the specifications.
- G. Investigate structural and finish conditions and arrange work accordingly. Provide all fittings, equipment, and accessories required for actual conditions.

1.12 SIMILAR MATERIALS

- A. All items of a similar type shall be products of the same manufacturer.
- B. Contractor shall coordinate among suppliers of various equipment to assure that similar equipment type is product of the same manufacturer.

- C. Examples of similar equipment types include but are not limited to:
 - 1. Power Circuit Breakers
 - 2. Enclosed Case Circuit Breakers
 - 3. Batteries
 - 4. UPS
 - 5. Surge Protection Devices
 - 6. Motor Starters
 - 7. Transformers
 - 8. Panelboards
 - 9. Switchboards
 - 10. Disconnects
 - 11. Fuses
 - 12. Transfer Switches

1.13 PRODUCT STORAGE, HANDLING AND DELIVERY

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

1.14 WARRANTY

- A. Following guarantee is a part of the specifications and shall be binding on the Contractor:
 - 1. "The Contractor guarantees that this installation is free from ALL defects. He agrees to replace or repair to the satisfaction of the Owner's Representative any part of the installation which may fall within a period of one year after date established below, provided that such failure is due to defects in the materials or workmanship or to failure to follow the specifications and drawings. Warranty of the Contractor furnished equipment or systems shall begin on the date the system or equipment is placed in operation for beneficial use of the Owner or occupancy by the Owner, whichever occurs first; such date to be determined in writing by the Owner's Representative by means of issuing a 'Certificate of Substantial Completion'."
- B. The extent of guarantees or warranties by Equipment and/or Materials Manufacturers shall not diminish the requirements of the Contractor's guarantee warranty to the Owner.
- C. All items of electrical equipment furnished and installed under Division 16 shall be provided with a full two (2) year parts and labor warranty unless extended by other divisions of this specification.

PART 2 PRODUCTS

2.01 QUALITY OF MATERIALS

- A. All equipment and materials shall be new, and shall be the standard product of manufacturers regularly engaged in the production of electrical equipment, and shall be the manufacturer's latest design. Specific equipment, shown in schedules on drawings and specified herein, is to set forth a standard of quality and operation.

2.02 EQUIPMENT REQUIREMENTS

- A. The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than those indicated on the electrical drawings, make all adjustments to wire and conduit size, controls, over current protection and installation as required to accommodate the equipment supplied. Delineate all adjustments to the drawings reflecting the electrical system in a submittal to the Contract Administrator immediately upon knowledge of the required adjustment.

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. Coordinate all work so that the construction operations can proceed without harm to the Owner from interference, delay, or absence of coordination. The Contractor shall be responsible for the size and accuracy of all openings.

3.02 DRAWINGS

- A. The electrical drawings show the general arrangement of all lighting, power, special systems, equipment, etc., and shall be followed as closely as actual building construction and work of other trades will permit. Whenever discrepancies occur between plans and specifications, the most stringent shall govern. All Contract Documents shall be considered as part of the work. Coordinate with architectural, mechanical, and structural drawings. Because of the small scale of the electrical drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. Provide all fittings, boxes, and accessories as may be required to meet actual conditions. Should conditions necessitate a rearrangement of equipment, such departures and the reasons therefor, shall be submitted by the contractor to the Engineer for review in the form of detailed drawings showing the proposed changes. No changes shall be

made without the prior written approval of the Engineer. All changes shall be marked on record drawings.

- B. Should any doubt or question arise in respect to the true meaning of the drawings or specifications, the question shall be submitted to the Engineer, whose decision shall be final and conclusive.
- C. Installation of all equipment shall be arranged to provide all clearances required for equipment operation, service, and maintenance, including minimum clearance, as defined by the National Electric Code (NEC).
- D. The installation of all concealed electrical systems shall be carefully arranged to fit within the available space without interference with adjacent structural and mechanical systems.

3.03 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical system, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate electrical systems, equipment, and materials installation with all other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in all other building components during progress of construction, to allow for electrical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum clearance possible.
 - 7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
 - 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
 - 10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect

equipment for ease of disconnecting, with minimum of interference with other installations.

11. Install access panel or doors where units are concealed behind finished surfaces.
12. Install systems, materials, and equipment giving right-of-way priority to systems requiring installation at a specified slope.

B. Install items level, plumb and parallel, and perpendicular to the building.

3.04 FIELD MEASUREMENTS

- A. No extra compensation shall be claimed or allowed due to differences between actual dimensions, including dimensions of equipment, fixtures and materials furnished, and those indicated on the drawings. Contractor shall examine adjoining work, and shall submit to Engineer any work which must be corrected. Review of submittal data in accordance with paragraph "Submittals" shall in no manner relieve the Contractor of responsibility for the proper installation of the electrical work within the available space. Installation of equipment and systems within the building space shall be carefully coordinated by the Contractor.

3.05 EQUIPMENT SUPPORT

- A. Provide support for equipment to the building structure. Provide all necessary structures, inserts, sleeves, firestops and hanging devices for installation of equipment. Coordinate installation of devices. Verify with the Engineer that the devices and supports are adequate as intended and do not overload the building's structural components in any way.

3.06 PAINTING

- A. All finish painting of electrical systems and equipment will be under "Painting", unless equipment is hereinafter specified to be painted.
- B. All equipment shall be provided with factory applied standard finish, unless otherwise specified.
- C. Touch Up: If the factory finish on any equipment is damaged in shipment or during construction of the building, the equipment shall be refinished to the satisfaction of the Engineer.

3.07 PROTECTION OF MATERIALS AND EQUIPMENT

- A. The Contractor shall be responsible for the protection of all work, materials and equipment furnished and installed under this section of the specifications, whether incorporated in the building or not.
- B. All items of electrical equipment shall be stored in a protected weatherproof enclosure prior to installation within the building, or shall be otherwise protected from the weather in a suitable manner approved by the Engineer.
- C. The Contractor shall provide protection for all work and shall be responsible for all damage done to property, equipment and materials. Storage of materials within the building shall be approved by the Engineer prior to such storage.
- D. Conduit openings shall be closed with caps or plugs, or covered to prevent lodgment of dirt or trash during the course of installation. At the completion of the work, fixtures, equipment and materials shall be cleaned and polished thoroughly and delivered in a condition satisfactory to the Engineer.

3.08 EXCAVATION

- A. Provide all excavation, trenching and backfilling required.
- B. Slope sides of excavations to comply with codes and ordinances. Shore and brace as required for stability of excavation.

3.09 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS "Structural Welding Code".

3.10 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

- C. Attach to substrates as required to support applied loads.

3.11 APPLICATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturer's printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
 - 1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
 - 2. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.
- B. Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
- C. Firestopping Sealant: Provide sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.12 INSTALLATION OF ACCESS DOORS

- A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.
- B. Adjust hardware and panels after installation for proper operation.

3.13 CUTTING AND PATCHING

- A. Perform cutting and patching per requirements below:
 - 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill-time Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in existing structures.
 - f. Upon written instructions from the Contracting Officer, uncover and restore Work to provide for Contracting Officer observation of concealed Work.

2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced installers.

3.14 MANUFACTURER'S INSTRUCTIONS

- A. All equipment shall be installed in strict accordance with recommendations of the manufacturer. If such recommendations conflict with plans and specifications, the Contractor shall submit such conflicts to the Engineer who shall make such compromises as he deems necessary and desirable.

3.15 CONCRETE BASES AND HOUSEKEEPING PADS

- A. Install concrete bases and housekeeping pads under all freestanding electrical equipment unless otherwise noted.
- B. Contractor shall be responsible for the accurate dimensions of all pads and bases and shall furnish and install all anchor bolts, etc. Coordinate weight of concrete bases and housekeeping pads with the structural Engineer.
- C. All concrete bases and housekeeping pads shall conform to the requirements specified under Division 3, Concrete, portions of these specifications. Pad foundations shall be 4" high minimum, unless otherwise indicated on the drawings. Chamfer edges shall be 1". Faces shall be free of voids and rubbed smooth with Carborundum block after stripping forms. Tops shall be level. Provide dowel rods or other required material in floor for lateral stability and anchorage.
- D. Equipment anchor bolts shall be set in a galvanized pipe or sheet metal sleeves 1" larger than bolt diameter. Anchor bolts shall be high strength steel J shape. Anchor bolt design shall be arranged and paid for by the Contractor.

3.16 TESTS

- A. All tests shall be conducted in the presence of the designated and authorized Owner's representative. The Contractor shall notify the Engineer one week in advance of all tests. The Contractor shall furnish all necessary equipment, materials, and labor to perform the required tests.

3.17 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. The Contractor shall furnish the Engineer complete operating and maintenance instructions covering all units of electrical equipment herein specified together with parts lists. Furnish four (4) copies of all the literature; each shall be suitably bound in loose-leaf book form.
- B. Operating and maintenance manuals as required herein shall be submitted to the Engineer for review not less than two (2) weeks prior to the date scheduled for the Contractor to provide Operating and Maintenance Instructions to the Owner as specified herein.
- C. Upon completion of all work and all tests, Contractor shall furnish the necessary skilled labor and helpers for operating the electrical systems and equipment for a period of five (5) days of eight (8) hours each. During this period, the Contractor shall instruct the Owner or his representative in the operations, adjustment and maintenance of all equipment furnished. Contractor shall provide at least two weeks notice to the Engineer in advance of this period, with a written schedule of each training session, the subject of the session, the Contractors' representatives who plan to attend the session, and the time for each session.

3.18 CERTIFICATIONS

- A. Before receiving final payment, certify in writing that all equipment furnished and all work done is in compliance with all applicable codes mentioned in these specifications. Submit certifications and acceptance certificates to the Contracting Officer, including proof of delivery of O&M manuals, spare parts required, and equipment warranties, which shall be bound with O&M manuals.

3.19 INTERRUPTING SERVICES

- A. The Contractor shall coordinate the installation of all work within the facility in order to minimize interference with the operation of existing electrical telephone, fire alarm, and utility systems during construction. Connections to existing systems requiring the interruption of service within the facility shall be carefully coordinated with the owner to minimize system downtimes. Requests for the

interruption of existing services shall be submitted to the Engineer in writing a minimum of two (2) weeks before the scheduled date. Absolutely no interruption of the existing services will be permitted without the written review of the Engineer.

3.20 OPERATION PRIOR TO ACCEPTANCE

- A. Operation of equipment and systems installed by the Contractor for the benefit of the Owner prior to substantial completion will be allowed providing a written agreement between the Owner and the Contractor has established warranty and other responsibilities to the satisfaction of both parties.

3.21 SITE VISITS AND OBSERVATION OF CONSTRUCTION

- A. The Engineer will make periodic visits to the project site at various stages of construction in order to observe the progress and quality of various aspects of the Contractor's work, in order to determine in general if such work is proceeding in accordance with the Contract Documents. This observation by the Engineer, however, shall in no way release the Contractor from his complete responsibility to supervise, direct, and control all construction work and activities, nor shall the Engineer have authority over, or a responsibility to means, methods, techniques, sequences, or procedures of construction provided by the Contractor or for safety precautions and programs, or for failure by the Contractor to comply with all law, regulations, and codes.

3.22 MEASUREMENT AND PAYMENT

- A. Work covered under this section of the specifications, and costs associated therewith, shall be included in the contract price for the item to which the work applies. No separate payment shall be made.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide and install:
 - 1. Component identification tags.
 - 2. Equipment nameplates.
 - 3. Wire markers
 - 4. Voltage markers.
 - 5. Warning signs.
 - 6. Arc flash warning labels.
 - 7. Floor marking.
 - 8. Underground warning tape.

1.02 SUBMITTALS FOR RELEASE

- A. Submit the following:
 - 1. Catalog Data: Submit manufacturer's catalog literature for each product required.
 - 2. Electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.
 - 3. Samples: Submit
 - a. Submit two samples of each type of identification products applicable to project.
 - b. Submit two nameplates illustrating materials and engraving quality.
- B. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.03 REGULATORY REQUIREMENTS

- A. Conform to requirements of the National Electrical Code (NEC) and OSHA.
- B. Conform to applicable requirements of the following ANSI Standards:
 - 1. Z535.1 Safety Color Code.
 - 2. Z535.2 Environmental and Facility Safety Signs.
 - 3. Z535.3 Criteria for Safety Symbols and Labels.
 - 4. Z535.4 Product Safety Signs and Labels.

5. Z535.5 Safety Tags and Barricade Tapes (for Temporary Hazards).

1.04 GENERAL

- A. Device, panel, circuit numbers, etc. shown in examples provided herein are for illustration purposes only. Use actual device, panel, circuit numbers, etc. based on installed project.

PART 2 PRODUCTS

2.01 LIGHTING AND POWER WIRE IDENTIFICATION

- A. Phase Identification (600 Volt Class):
1. Type:
 - a. #12 AWG Through #6 AWG Wire: Solid color insulation throughout conductor length.
 - b. #4 AWG and Larger Wire: Vinyl plastic electrical color coding tape, 3/4" wide.
 2. Colors:
 - a. 120/240 Volt, Single-Phase Conductors:
 - i. Line 1: Black.
 - ii. Line 2: Red.
 - iii. Neutral: White.
 - iv. Ground: Green.
 - b. 120/208 Volt Conductors:
 - i. Phase A: Black.
 - ii. Phase B: Red.
 - iii. Phase C: Blue.
 - iv. Neutral: White.
 - v. Ground: Green.
 - c. 480 Volt, 3-Phase, 3-Wire:
 - i. Phase A: Brown.
 - ii. Phase B: Orange.
 - iii. Phase C: Yellow.
 - d. 277/480 Volt, Three-Phase Conductors:
 - i. Phase A: Brown.
 - ii. Phase B: Orange.
 - iii. Phase C: Yellow.
 - iv. Neutral: Gray.
 - v. Ground: Green.
- B. Phase Identification (4160 and 12470 Volt Class):
1. Type: Vinyl plastic electrical coding tape, 3/4" wide.
 2. Colors:

- a. 4.160 KV Conductor:
 - i. Phase A: (1) Red band.
 - ii. Phase B: (2) Red bands.
 - iii. Phase C: (3) Red bands.
 - b. 12.47 KV Conductor:
 - i. Phase A: (1) Blue band.
 - ii. Phase B: (2) Blue bands.
 - iii. Phase C: (3) Blue bands.
- C. Circuit Identification (600 Volt Class):
- 1. Print technology: Thermal transfer.
 - a. Type: Polyolefin heat-shrink tubing.
 - b. Shrink Ratio: 3:1.
 - c. Color: White.
 - d. Size: As required for application.
 - e. Compliance: UL224 recognized.
 - f. Manufacturer's Reference: Brady B-342 PermaSleeve PS.
 - 2. Legend: Panel and circuit number.
- D. Circuit Identification (4160 and 12470 Volt Class): None.

2.02 CONTROL WIRE AND CABLE IDENTIFICATION

- A. Wire Identification – Panel Interior:
- 1. Type: Solid color insulation throughout conductor length.
 - a. 120 Volt:
 - i. Line: Red.
 - ii. Neutral: White.
 - iii. Ground: Green.
 - b. 24 Volt:
 - i. Direct Current Positive Supply: Blue.
 - ii. Direct Current Negative Supply: Black.
 - iii. 24 VDC Output Signal Wire: Yellow.
 - iv. 24 VDC Input Signal Wire: Orange.
 - v. Ground (AC or DC): Green.
- B. Wire Identification – Field Wiring:
- 1. Analog cable, in accordance with Specification Section 16123: Low-Voltage Wire and Cable.
 - a. Color: Manufacturer's standard color.
 - 2. Discrete cable, in accordance with Specification Section 16123: Low-Voltage Wire and Cable.
 - a. Colors:
 - b. 120 Volt:
 - i. Line: Red.
 - ii. Neutral: White.

- iii. Ground: Green.
- c. 24 Volt:
 - i. Direct Current Positive Supply: Blue.
 - ii. Direct Current Negative Supply: Black.
 - iii. 24 VDC Output Signal Wire: Yellow.
 - iv. 24 VDC Input Signal Wire: Orange.
 - v. Ground (AC or DC): Green.

C. Circuit Identification:

- 1. Print technology: Thermal transfer.
 - a. Type: Polyolefin heat-shrink tubing.
 - b. Shrink Ratio: 3:1.
 - c. Color: White.
 - d. Size: As required for application.
 - e. Compliance: UL224 recognized.
 - f. Manufacturer's Reference: Brady B-342 PermaSleeve PS.
- 2. Legend: "Source/Destination": To develop source and destination used for identification, use naming convention shown on Drawings. Ensure that manufacturer's actual wire terminal designations are included.
 - a. Example: (Replace "##" with actual wire terminal designations)

(LT-RES)##/(RTU)##

2.03 EQUIPMENT IDENTIFICATION

A. General:

- 1. Provide nameplates in accordance with the following requirements, unless otherwise noted on the Drawings.
- 2. Center nameplate lettering on nameplate, vertically and horizontally.
- 3. Use same font type/style for all nameplates.
- 4. Use normal font spacing. Do not use condensed font.
- 5. Use tags/nameplates of the same size and with same font size and letter spacing for nameplates of a similar purpose, for example, the nameplates for all of the individual sections (or cubicles) of a motor control center.

B. Type:

- 1. Interior Locations: Rectangular, engraved two-layer UV stabilized Gravoply™. Block style white lettering, text size as indicated below, on black background, unless otherwise noted.
- 2. Exterior Locations: Rectangular Type 316 stainless steel nameplate, 0.047 inch minimum thickness. Laser "BLACK" etched with minimum 1/32 inch etch width block style lettering, text size as indicated below.

C. Legends:

- 1. Panelboards: Label with device number and source description as shown below. 3/8" high text.

- Device Number
SERVED FROM: Description of Power Source
- a. Example:
- PANEL A
SERVED FROM: DISCONNECT SWITCH DS
- b. Circuit Breaker Directory:
- i. Type: Manufacturer's standard directory card supplied with panelboard Typewritten or process printed, except "SPARE" and "SPACE" circuits, which shall be hand lettered in erasable pencil.
 - ii. Legends: In accordance with panel schedule in Drawings.
- c. Circuit Breaker Identifications
- i. Type: Engraved three-layer laminated plastic strip installed vertically along left and right hand sides of panelboard, adjacent to circuit breakers. Block style white lettering, minimum 1/4 inch high, on black background.
 - ii. Numbering Conventions: In accordance with panel schedule in Drawings.
2. Disconnect Switches, Including Fractional Horsepower Manual Motor Starting Switches: Label with device number, source, and load description as shown below. 1/4" high text for disconnect switches, 3/16" high text for fractional horsepower manual motor starting switches. Use "Exterior Locations" Type label for fractional horsepower manual motor starting switches.

Device Number
SERVED FROM: Description of Power Source
LOAD: Identification of Load Served

- a. Example:

DS-MIX-S1
SERVED FROM: MCC-4B/MCU-MIXS1
LOAD: MIX-S1

3. Discrete Motor Starters, Including Fractional Horsepower Manual Motor Starters: Label with device number, source, and load description as shown below. 1/4" high text for discrete motor starters, 3/16" high text for fractional horsepower manual motor starters. Use "Exterior Locations" Type Label for fractional horsepower manual motor starters.

Device Number
SERVED FROM: Description of Power Source
LOAD: Identification of Load Served

- a. Example:

MCU-AC1
SERVED FROM: MCC-4A/SECT 2

2.04

LOAD: AC-1INSTRUMENTS NAMEPLATES

A. Type: Rectangular Type 316 stainless steel nameplate, 0.047 inch minimum thickness. Laser etched with minimum 1/32 inch etch width block style lettering, 3/16 inch high text.

B. Legend: Instrument identification as indicated on the Drawings.

Example:

LT-RES

2.05 OUTLET IDENTIFICATION

A. Furnish a typewritten or machine printed label for each switch and receptacle outlet indicating circuit number, panelboard, and voltage.

B. Provide labels of the following materials:

1. Laminated plastic adhesive tape with machine printed letters.
2. Manufacturer: Brother.

C. Provide black, 10 point minimum size lettering on a white background.

2.06 VOLTAGE IDENTIFICATION

A. Type: Self adhesive vinyl cloth printed with black characters on an orange background.

B. Manufacturer's Reference: Brady Series 44000, B-500 vinyl cloth labels.

C. Legends: "120 V", "120/208V", "4160V", "12470V", etc.

2.07 EMERGENCY SYSTEM IDENTIFICATION

A. Furnish identification for emergency system generators, transfer switches, transformers, switchgear, panelboards, starters, motor control centers, safety switches, pull boxes, junction boxes, enclosures, and cabinets as require by NEC Article 700.

B. Provide flexible pressure sensitive vinyl markers with minimum 1-1/8 inch X 4-1/4 inch orange background and black letters indicating EMERGENCY SYSTEM.

2.08 WARNING SIGNS

- A. Furnish warning signs for low-voltage and medium-voltage transformers, switchgear, switchboards, panelboards, motor starters, motor control centers, safety switches, pull boxes, and cabinets.
- B. Use flexible warning signs that conform to ANSI Z535.4 and OSHA Danger and Caution specifications.
- C. Provide minimum 2 inches by 4 inches warning signs.
- D. Provide warning signs with format and lettering as follows:
 - 1. Signal word: DANGER
 - 2. Signal word panel color: red with safety alert symbol.
 - 3. Word message: "Keep Out! Hazardous voltage inside. Will shock, burn, or cause death."
 - 4. Safety symbol: ISO 3864 "lightning bolt" in yellow triangle.
- E. Materials:
 - 1. For indoor applications use flexible, pressure sensitive, polyester base with polyester overlamine.
 - 2. For outdoor applications use aluminum signs.
- F. Manufacturer: Seton Name Plate Co., Safety Label Solutions, Hazard Communication Systems, Electromark.

2.09 UNDERGROUND CONDUIT IDENTIFICATION

- A. Type: Metal detectable polyester tape with subsurface graphics, 6 inches wide, 4.5 mil thick, continuously imprinted on one side of tape. Black letters on red background.
- B. Manufacturer's Reference: Dottie Detectable warning tape.
- C. Legends:
 - 1. Power Conduit:
CAUTION: BURIED ELECTRIC LINE BELOW
 - 2. Controls and Communication Conduit:
CAUTION: BURIED DATA LINE BELOW

2.10 MISCELLANEOUS NAMEPLATE AND LABELS

- A. In addition to nameplates and labels required herein, provide additional nameplates and labels as required to by ANSI/NFPA 70, ANSI C2, OSHA, and the authority having jurisdiction.
- B. Add the following labels to service entrance equipment:
 - 1. Maximum available fault current.

2. Date on which fault current was calculated.

PART 3 EXECUTION

3.01 GENERAL

- A. Do not install nameplates or labels until samples have been submitted and approved.
- B. Install nameplates and labels parallel to equipment lines.

3.02 WIRE IDENTIFICATION

- A. General:
 1. Power Wire: Identify phasing of all power wiring. Identify circuiting of all 600 volt class power wiring.
 2. Control Wire and Cable: Identify all control wire and cable.
- B. Location:
 1. At or within 6 inches of conductor point of termination and on each side of an approved splice (for example, splicing the factory cable of an intrusion switch to field wiring) in an intermediate junction or pull box. (Labels are not required on wire that passes unspliced through an intermediate junction or pull box.)
 2. Apply so that identifications are clearly visible with equipment or box cover opened or removed.
- C. Application:
 1. Color Coding Tape: Tightly wind tape around insulation and extend 2 inches along conductor.
 2. Heat Shrink Labels: Install in accordance with manufacturer's instructions. Do not shrink labels.

3.03 EQUIPMENT IDENTIFICATION

- A. General: Identify all Division 16 equipment. In addition to nameplates specifically required in the Specifications or on the Drawings, provide an additional 36 nameplates, maximum dimension 3" x 9", with nameplate and text color, text size, mounting location, and legend to be determined by Owner. These nameplates are in addition to any additional nameplates that may be required in Section 13401.

- B. Nameplate Locations:
 - 1. General: In general, nameplates shall be located in the top-center portion of the enclosure. Review exact nameplate locations with the Owner prior to installation.
 - 2. Fuse Nameplates: In general, locate in lower right-hand corner of motor control center cubicle or safety switch door. Review exact nameplate locations with the Owner prior to installation.
- C. Fixing: Adhesive attachment.

3.04 INSTRUMENT AND SMALL EQUIPMENT NAMEPLATES

- A. Install nameplates on instruments and small equipment shown on drawings.
- B. Attach nameplate to instrument with 316 stainless steel wire. Attachment point may be on conduit attached to instrument or equipment, as long as nameplate is adjacent to instrument or equipment.

3.05 VOLTAGE IDENTIFICATION

- A. General: Identify all Division 16 electrical equipment, Contractor and Owner furnished, and other electrical equipment which is served from power circuits. Install voltage markers at the following locations and position markers so marker can be read from floor:
 - 1. Front and rear of each medium-voltage switchgear.
 - 2. Front of each medium-voltage transformer.
 - 3. Front and rear of each free-standing low-voltage switchgear or switchboard section.
 - 4. Front of each low-voltage transformer, switchboard, panelboard, motor control center, enclosed circuit breaker, safety switch and starter enclosure.
 - 5. Cover of each pull box containing low-voltage or medium-voltage conductors.
 - 6. Each 2 inch and larger conduit longer than 6 feet; space markers not more than 20 feet on center.

3.06 WARNING SIGNS

- A. Install warning signs at the following locations and position signs so they can be read from floor:
 - 1. Front and rear of each medium-voltage switchgear.
 - 2. Front of each medium-voltage transformer.
 - 3. Front and rear of each low-voltage switchgear or switchboard section.

4. Front of each low-voltage transformer, switchboard, panelboard, motor control center, enclosed circuit breaker, safety switch, and motor starter enclosure.
5. Cover of each pull box containing exposed low-voltage or medium-voltage conductors.

3.07 UNDERGROUND CONDUIT AND DUCT IDENTIFICATION

- A. General: Provide warning tape for all exterior underground conduit.
- B. Location: In continuous length along center line of trench, 12 inches below finished grade.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Conduit, conduit couplings, connections, adapters, fittings, clamps, hangers and appurtenant hardware.

1.02 RELATED WORK

- A. Specification Section 16010: Basic Electrical Requirements
- B. Specification Section 16123: Low-Voltage Wire and Cable.
- C. Specification Section 16130: Boxes.

1.03 REFERENCES

- A. ANSI C80.1 - Rigid steel conduit, zinc-coated
- B. ANSI C80.3 - Electrical Metallic Tubing - zinc coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. FS WW-C-566 - Specification for flexible metal conduit.
- F. NECA "Standard of Installation".
- G. NEMA RN 1 - Polyvinyl Chloride (PVC) externally-coated galvanized rigid steel conduit and electrical metallic tubing.
- H. NEMA TC 2 - Electrical plastic tubing (EPT) and conduit (EPC-40 and EPC-80).
- I. NEMA TC 3 - PVC fittings for use with rigid PVC conduit and tubing.
- J. SSPC-SP1 – Surface Preparation Standards and Specifications (Solvent cleaning).

1.04 DEFINITIONS

- A. See Section 16010 for the definitions of Dry Interior Locations, Wet Interior Locations, Exterior Locations, and Corrosive Atmosphere Locations, and Classified Locations.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code" and ANSI C2 "National Electrical Safety Code" for components and installation.
- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver conduits to site with ends capped. Store nonmetallic conduits with supports to prevent warping, and deforming, and cover to protect from UV degradation.
- B. All conduits with visible damage, corrosion or discoloration from UV exposure will be rejected.

PART 2 PRODUCTS

2.01 GENERAL

- A. Application: See conduit schedule in PART 3 for the application of the following types of conduits to this Project. It should be noted that not all conduit types specified in PART 2 of this Specification will necessarily be used on this Project.

- 2.02 ELECTRICAL METALLIC TUBING (EMT)
- A. Type: ANSI C80.3; galvanized tubing.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB1; compression type, steel or malleable steel.
 - C. Grounding Bushings: ANSI/NEMA FB1; insulated lay-in grounding type, steel or malleable steel.
 - D. Listing: UL 797 listed.
- 2.03 RIGID METALLIC CONDUIT (RMC)
- A. Conduit: ANSI C80.1; Rigid Galvanized Steel Conduit.
 - B. Conduit: ANSI C80.5; Rigid Aluminum Conduit.
 - C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, steel or malleable iron. Compression, setscrew, and crimp type fittings and conduit bodies are not acceptable.
 - D. Grounding Bushings: ANSI/NEMA FB 1; insulated lay-in grounding type, steel or malleable iron.
 - E. Listing: UL 6 listed.
- 2.04 POLYVINYL-CHLORIDE COATED RIGID METAL CONDUIT (PVC-RMC)
- A. Conduit: NEMA RN 1; rigid steel conduit with external 40 mil PVC coating and internal galvanized surface.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; NEMA Type TC 3; threaded type, steel or malleable iron with external PVC coating to match conduit. Compression, setscrew, and crimp type fittings and conduit bodies are not acceptable.
 - C. Ground Bushings: ANSI/NEMA FB 1; insulated lay-in grounding type, steel or malleable iron.
 - D. Listing: UL listed.
- 2.05 RIGID NONMETALLIC CONDUIT (RNMC)
- A. RNMC of polyvinyl chloride:
 - 1. Per NEC 347, UL 651 and NEMA TC2 for EPC 40.

2. UL-listed for use with 90 degree Celsius conductors.
3. Ultraviolet resistant, Schedule 40 polyvinyl chloride (except Schedule 80 where called for on Drawings).
4. Joints: glued, except provide bell-and-spigot expansion joint with "O" rings where required for expansion/contraction.
5. Fittings and cement: by conduit manufacturer.
6. Manufacturer / Product: Carlon Plus 40/Plus 80 or equal.

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Conduit: FS WW-C-556, flexible steel conduit.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1, steel or malleable iron.
- C. Listing: UL listed.

2.07 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

- A. Conduit: FS WW-C-566; flexible steel conduit with PVC jacket.
- B. Fittings and Conduit Bodies:
 1. Non-corrosive environments: ANSI/NEMA FB 1, steel or malleable iron.
 2. Corrosive and Class 1 environments; malleable iron.
- C. Listing: UL listed.

2.08 FLEXIBLE EXPLOSION PROOF CONDUIT (XPFC)

- A. Braided steel or copper alloy with inner insulating sleeve.
- B. Fittings: Threaded.
- C. Product: Crouse Hinds Series EC or equal.

2.09 COUPLINGS

- A. ENMT: Glued on fitting same as used for coupling RNMC.
- B. EMT:
 - 1. Steel, not die cast.
 - 2. Concrete tight and rain tight compression type.
 - 3. Set screw or indenter type will not be acceptable.
- C. LFMC, FMC: Not allowed.
- D. Other conduits: As required by NEC and recommended by manufacturer.

2.10 CONNECTORS

- A. EMT:
 - 1. Steel, not die cast.
 - 2. Concrete tight and rain tight compression type.
 - 3. Set screw or indenter type will not be acceptable.
- B. FMC:
 - 1. Steel squeeze type.
 - 2. Appleton 7484 or equal.
- C. LFMC: Liquid tight steel, insulated throat.
 - 1. Steel squeeze type.
 - 2. Appleton ST/STB or equal.

2.11 CONDUIT SEALING FITTINGS

- A. Equipment provided for use in classified areas shall be suitable for the Material Classification Group as defined by NFPA 70, of the hazardous materials present.
- B. Galvanized steel, aluminum when connected to aluminum conduit.
- C. UL 1203.

2.12 CONDUIT SUPPORTS:

- A. In accordance with Section 16190.

2.13 CORROSION PROTECTION TAPE

- A. Manufacturer's Reference: 3M "Scotchrap 51" tape and 3M "Scotchrap" Pipe Primer.
- B. Type: Pressure-sensitive PVC-base corrosion protection tape, 20 mils thick, used in conjunction with compatible rubber base primer.

PART 3 EXECUTION

3.01 DRAWINGS

- A. Conduit Runs:
 - 1. Conduit runs are not fully detailed on the Drawings and do not necessarily call out all specific junction boxes, fittings, or connection types that may be required.
 - 2. Conduits are shown in spatial schematic location only relative to other structures. Contractor shall evaluate final route as necessary for final installation in compliance with NEC requirements and as approved by Engineer prior to installation.
 - 3. In addition to conduits shown:
 - a. Install as implied by circuiting, and as required for a complete system.
 - b. Install as called for on the One Line Diagram.

3.02 SCHEDULE

- A. Above Grade Installation:
 - 1. Size: Per the Drawings, Conduit Schedule, and other sections of these Specifications. Minimum $\frac{3}{4}$ inch, unless otherwise noted.
 - 2. Dry Interior Locations or housing Closed Water Processes:
 - a. Lighting, Receptacle, HVAC Control, and Access Alarm Circuits: Rigid Metal Conduit (RMC) and fittings.
 - b. Conduit in joist space: Electrical Metallic Tubing (EMT) and fittings.
 - c. Conduit concealed in CMU Block Wall: Schedule 40 Non-Metallic Conduit (PVC) and fittings.
 - d. All Other Applications and Locations Not Mentioned Above: Rigid Metal Conduit (RMC) and Fittings.
 - 3. Exterior Locations / Wet Interior Locations / Corrosive Atmosphere Interior or Corrosive Atmosphere Exterior Locations / Hazardous Locations:
 - a. Lighting, Receptacle, HVAC Control, and Access Alarm Circuits: PVC Jacketed Rigid Metal Conduit (PVC-RMC) and fittings.

- b. All Other Applications and Locations Not Mentioned Above: PVC Jacketed Rigid Metal Conduit (PVC-RMC) and Fittings.
- 4. CMU Block Wall / Exposed Trusses Building Type Installation Procedure:
 - a. Lighting, Receptacle, and Intrusion Alarm Circuits: Conceal conduit in CMU block wall for attachment to outlet boxes associated with receptacles, light switches, wall-mounted light fixtures, and intrusion switches. Conduit for light fixtures supported from roof trusses shall be run exposed within and supported from the webs of the trusses.
 - b. All Other Applications and Locations Not Mentioned Above: Route conduit exposed on interior CMU walls.
- 5. Hollow Stud Wall / Suspended Ceiling Building Type Installation Procedure:
 - a. Lighting, Receptacle, and Intrusion Alarm Circuits: Conceal conduit in stud wall for attachment to outlet boxes associated with receptacles, light switches, wall-mounted light fixtures, and intrusion switches. Conduit for light fixtures supported from suspended ceiling shall be run concealed within ceiling and supported from the webs of the joists.
 - b. All Other Applications and Locations Not Mentioned Above: Route conduit concealed within interior of stud walls.
- 6. Metal Building with Exposed Frame Wall / Rafter Building Type Installation Procedure:
 - a. Lighting, Receptacle, and Intrusion Alarm Circuits: Conduit shall be run exposed for attachment to outlet boxes associated with receptacles, light switches, wall-mounted light fixtures, and intrusion switches. Conduit for light fixtures supported from roof joists shall be run exposed within and supported from the rafters with appropriate anchored supports.
 - b. All Other Applications and Locations Not Mentioned Above: Route conduit exposed on interior wall frame horizontal and vertical members with appropriate anchored supports.
- 7. Metal Building with concealed Frame Wall and exposed Rafter Building Type Installation Procedure:
 - a. Lighting, Receptacle, and Intrusion Alarm Circuits: Conceal conduit in stud or framed wall surface for attachment to outlet boxes associated with receptacles, light switches, wall-mounted light fixtures, and intrusion switches. Conduit for light fixtures supported from roof joists shall be run exposed within and supported from the rafters with appropriate anchored supports.
 - b. All Other Applications and Locations Not Mentioned Above: Route conduit concealed within interior stud walls.
- 8. Pre-Cast or Cast-in-Place Concrete Wall Basin/Vault Structure above maximum water level Installation Procedure:

- a. Power, Control, Lighting, Receptacle Circuits: Route PVC-RNMC conduit embedded and anchored to concrete reinforcement. Install PVC-RMC conduit for all vertical or horizontal elbows beyond 15 degrees, and all concrete entrances/exits exposed for attachment to NEMA 4X rated boxes associated with receptacles, motor starters/disconnects, submersible cord/conduit connections, and switches.
 - b. All Other Applications and Locations on exterior wall surface (and as identified in Drawings): Route RMC mounted on stainless steel metal framing channels anchored to concrete walls.
 - 9. Liquidtight Flexible Metal Conduit: Use for connection to motor, motor operated valves, dry-type transformer, mechanical equipment, instrumentation, and devices which produce vibration. Restrict maximum length to 36 inches.
- B. Below Grade Installation:
- 1. Size: Per the Drawings, Conduit Schedule, and other sections of this Specifications. Minimum $\frac{3}{4}$ inch, unless otherwise noted.
 - 2. Buried Type: Schedule 40 non-metallic conduit (PVC), unless otherwise noted, and concrete encased where noted, except under concrete slabs.
 - 3. Wet Interior Locations / Corrosive Atmosphere Interior Area:
 - a. Power, Control, Lighting, Receptacle, HVAC Control, and Access Alarm Circuits: PVC Jacketed Rigid Metal Conduit (PVC-RMC) and fittings.
 - b. All Other Applications and Locations Not Mentioned Above: PVC Jacketed Rigid Metal Conduit (PVC-RMC) and Fittings.
 - 4. Damp Interior Locations:
 - a. Lighting, Receptacle, HVAC Control, and Access Alarm Circuits: Rigid Metal Conduit (RMC) and fittings.
 - b. All Other Applications and Locations Not Mentioned Above: Rigid Metal Conduit (RMC) and Fittings.
 - 5. Pre-Cast or Cast-in-Place Concrete Wall / Roof Vault Structure with Dry Interior Process Piping Installation Procedure:
 - a. Power, Control, Lighting, Receptacle, and Intrusion Alarm Circuits: Route Rigid Metallic Conduit (RMC) and fittings conduit exposed for attachment to NEMA 6P rated boxes associated with receptacles, light switches, wall-mounted light fixtures, cord/conduit connections, and intrusion switches. Conduit for light fixtures supported from roof beams shall be run exposed within and supported from beam attachments. Provide conduit sleeves and compressed flexible annular sealing systems.
 - b. All Other Applications and Locations Not Mentioned Above: Route conduit exposed and attached to interior concrete wall surface.
 - 6. Cast-in-Place Concrete Wall / Roof Building Type with Partially/Fully Submerged Interior Installation Procedure:
 - a. Lighting, Receptacle, and Intrusion Alarm Circuits: Not allowed.

- b. Power and Control Circuits: PVC Jacketed Rigid Metal Conduit (PVC-RMC) and Fittings with cord connections and conduit seal-offs.
- c. All Other Applications and Locations Not Mentioned Above: Route conduit exposed and attached to interior concrete wall surface.
- d. Liquidtight Flexible Metal Conduit: Use for connection to motor, motor operated valves, dry-type transformer, mechanical equipment, instrumentation, and devices which produce vibration. Restrict maximum length to 36 inches.

3.03 INSTALLATION – GENERAL

- A. Install conduit in accordance with NECA "Standard of Installation".
- B. Where indicated on the Drawings, and where necessary to terminate conductors, tap-off, or redirect multiple conduit runs, provide appropriately designed junction boxes. Provide pull boxes to limit the number of directional changes of conduit to a total of not more than 270 cumulative degrees in any run between pull-boxes. Conduit runs between pull-boxes shall be limited to 400 feet maximum, less 100 feet for each 90-degree change in direction. Provide pull boxes, if necessary to meet these requirements, in accordance with Specification Section 16130: Boxes.
- C. Maintain minimum 6 inch clearance between conduit and piping for above grade installations, 12 inches clearance for below grade installations, unless otherwise noted.
- D. Maintain minimum 12 inch clearance between conduit and surfaces with temperature exceeding 104 degrees F (40 degrees C).
- E. Support linear runs of conduit as scheduled below. In addition, support conduit within one foot of elbow, bend, change of direction, and terminations using framing channel specified in Section 16190. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
 - 1. Rigid Metal Conduit and Fittings (RMC): 8'-0" maximum.
 - 2. Electrical Metallic Tubing (EMT):
 - a. 1/2" Diameter: 6'-0" maximum.
 - b. 3/4" Diameter and Larger: 8'-0" maximum.
 - 3. PVC Coated Rigid Metal Conduit and Fittings (PVC-RMC): 8'-0" maximum.
 - 4. Non-Metallic Conduit and Fittings (PVC):
 - a. 1/2" to 1" Diameter: 3'-0" maximum.
 - b. 1-1/4" to 2" Diameter: 5'-0" maximum.
 - c. 2-1/2" Diameter and Larger: 6'-0" maximum.
- F. Use grounding bushings on conduit terminations.

- G. Use conduit hubs to fasten conduit to sheet metal enclosures. Conduit connections shall maintain the integrity of the NEMA rating of the enclosure they enter.
- H. Provide pull wire/rope per Specification Section 16123: Low-Voltage Wire and Cable in each empty conduit.
- I. Join nonmetallic conduit (PVC) using cement recommended by conduit manufacturer
- J. Conduit bends in all but EMT:
 - 1. Factory-made or made with a conduit bending machine recommended by the conduit manufacturer. Handmade bends will not be acceptable.
 - 2. All bends shall be made with a bender that is not capable of reducing the size of the conduit while being bent, and shall leave no marks or scars on conduit.
 - 3. Where a conduit bank changes plane while changing direction, it is acceptable to use factory 90-degree elbows for the largest conduit in the bank. All conduits smaller than the largest conduit shall use the same radius as the largest conduit.
 - 4. Where a conduit bank stays in the same plane and changes direction, all conduits shall have the same radius center point/concentric bends (exception: where the bank of conduits is less than five the conduits can have the same radius provided there are no concentric bends in the area).
 - 5. Where a conduit bank offsets from one plane to another plane all bends shall match in bend angle, distance between bends and placement of bends.
 - 6. Where a conduit bank offsets on the same plane, the center of the bend shall line up on all adjacent bends while the distance between conduits is maintained the same throughout.
- K. Make bends in EMT with a hand bender that fully supports the side walls.
- L. Conduit Routing:
 - 1. All conduit shall be concealed in finished areas and where indicated on the Drawings.
 - 2. In many places, such as at motors and surface mounted wiring devices in process rooms and electrical rooms, the end of a run may be an exposed vertical riser even though the symbol used for the conduit run denotes concealed. Clarify routing with Engineer prior to installation of exposed conduits.
 - 3. For exposed conduit to be installed in unfinished building areas, such as metal buildings with no framed walls, install conduit either parallel with or perpendicular to structural members of the building or structure, except where allowed otherwise by the Engineer.
 - 4. Roof Penetrations:
 - a. The only conduit that may be run on a roof is conduit that serves equipment on that roof.

- b. Locate sealed roof penetrations so no horizontal runs of conduit are required on the roof.
- M. Sleeve wall Conduit Penetrations:
 - 1. Sleeve floor penetrations where through intermediate floors of a building and in other places indicated on the Drawings.
 - 2. Material: Rigid metal conduit (RMC) or steel pipe securely fastened in place.
 - 3. Set sleeves in masonry walls during construction.
 - 4. Set sleeves in concrete before placement.
 - 5. Extend floor sleeves 2 inches up except where shown otherwise on the Drawings.
 - 6. Waterproof construction sleeves: Flanged type.
 - 7. Exterior building wall sleeves:
 - a. Install conduit in center of sleeve.
 - b. Pack interior and exterior annular space around conduit with plastic backer rod sized to fit annular space in compression as recommended by backing manufacturer.
 - c. Seal interior and exterior of joint with acrylic polymer sealant: DAP, subsidiary of Plough, Inc or equal.
 - 8. Openings required after footings, walls, floors or ceilings constructed shall be provided and grouted at no additional expense to Owner.
- N. Trip Hazard Locations:
 - 1. Conduit shall not be installed on slabs, walkpaths, decks, sidewalks or floors where it may create a trip hazard. The Engineer shall be the sole judge as to "trip hazard".
 - 2. Conduits may be installed on concrete surfaces only with written permission from the Engineer.
- O. Conduits installed under floor slabs shall lie completely under the slab with no part of the horizontal run of the conduit embedded within the slab.
- P. Conduit embedded in structural concrete:
 - 1. Where shown on the Drawings.
 - 2. No conduit shall be embedded in the walls of tanks or basins below the high water elevation, except when absolutely necessary and where specifically shown on the Drawings.
 - 3. Set before concrete is poured.
 - 4. Route in direct line, with bends as large a radius as practical.
 - 5. Anchor all conduits to concrete reinforcing to prevent damage during concrete installation. Do not interfere with concrete reinforcing.
- Q. Expansion joints: Where conduit spans building expansion joints or in long duct runs, use expansion fittings and bonding jumpers.

- R. Drainage:
 - 1. Avoid pockets in conduit runs.
 - 2. Provide suitable drainage fittings in junction boxes at low spots in exposed conduit.
 - 3. Weep holes not permitted.

- S. Field Cuts and Threads:
 - 1. Cut ends of conduit square with hand or power saw and ream to remove burrs and sharp edges.
 - 2. Do not use wheel cutter.
 - 3. Threads cut on job shall have same effective length, thread dimensions and taper as factory-cut threads.
 - 4. Carefully remove burrs from threads and paint conduit threads with one coat of zinc chromate to male threads.

- T. Conduit ends:
 - 1. Cap spare conduit.
 - 2. Open conduit ends terminating in trenches, panels or enclosures: plug space around cables with commercial duct sealing compound.
 - 3. Cap conduit ends during construction to prevent entrance of foreign material.

- U. Cleaning: clean and swab inside by mechanical means to remove foreign materials and moisture before wires or cables are installed.

- V. Install PVC-RMC in strict accordance with the manufacturer's instructions. Use strap type wrenches. Pipe wrenches are not acceptable. PVC boot shall cover all threads. Leave no metallic threads uncovered. Use touch-up compound as recommended by the manufacturer to cover gouges and bare metal after installation.

3.04 INSTALLATION – ABOVE GRADE CONDUIT

- A. Route conduit parallel and perpendicular to walls.
- B. Route conduit to maintain headroom and present neat appearance.
- C. Route conduit through roof using flashing and sealants.
- D. Support conduit using straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

- F. Support surface mounted conduit routed along walls on framing channel with conduit straps or clamps.
- G. Group related conduit in parallel runs where practical. Use conduit rack constructed of channel with conduit straps or clamps. Provide junction box with drain fitting at conduit low point, if necessary.
- H. Avoid moisture traps where possible. Provide junction box with drain fitting at conduit low point, if necessary.
- I. Seal conduit which passes through exterior wall penetrations using suitable sealants.
- J. Stub up and cap spare conduit 6 inches above finish floor where required on Drawings. Install pull wire in conduit and thread cap over pull wire to secure pull wire in place.
- K. Supports:
 - 1. Hangers, supports or fastenings:
 - a. Provide at each elbow and at end of every straight run terminating in box or cabinet.
 - b. Rigid fastenings spaced maximum of 7 feet horizontal, 8 feet vertical.
 - c. Adjustable supports spaced maximum of 7 feet.
 - 2. Clamps: Comply with Section 16190.
 - 3. One hole straps are to be installed with hole below conduit in horizontal runs.
 - 4. Trapeze hanger:
 - a. Use to support horizontal runs only.
 - b. Install U-bolts at end of each run and at each elbow.
 - c. Install clamps every third intermediate hanger for each conduit.
 - d. Hangers are not detailed but must be adequate to support combined weight of conduit, conductors and hangers.
 - e. Material:
 - i. Aluminum unistrut with stainless steel fittings.
 - ii. As specified in Section 16190 or equal.
- L. CMU Wall Concealment: Coordinate and install conduits concealed in CMU block wall prior to insulation and bond grout installation for attachment to cast-in-place boxes.

3.05 INSTALLATION - BELOW GRADE CONDUIT

- A. Route conduit from point-to-point, unless otherwise noted.

- B. Install top of conduit minimum 24 inches below finish grade for circuits 600 volts and less, unless otherwise noted. Install top of conduit minimum 42 inches below finish grade for medium voltage circuits, unless otherwise noted.
- C. Provide minimum separation between conduits as noted below:
 - 1. 3" for 2" and larger conduit.
 - 2. 2" for 1-1/2" and smaller conduit.
 - 3. Regardless of conduit size, provide 3" side-to-side clearance for conduit containing alternating current power circuits and conduit containing direct current control or instrumentation wiring for parallel conduit in multiple conduit runs.
- D. Stagger joints in multiple conduit runs 6 inches minimum horizontally.
- E. Join nonmetallic conduit (PVC) using cement recommended by conduit manufacturer.
- F. Use factory made chairs/separators to support and separate conduit.
- G. Anchor conduit to prevent movement during concrete placement or earth back fill.
- H. If concrete encasement is specified on drawings, provide minimum 4 inches, 3000 psi concrete encasement on all sides of conduit, except under concrete slabs, where conduit does not have to be concrete encased.
- I. Use PVC-coated rigid metal elbows and conduit (PVC-RMC) or rigid metal elbows and conduit (RMC) with corrosion protection tape for bends greater than or equal to 15 degrees and vertical risers in underground non-metallic conduit (PVC) runs.
- J. Apply an application of half-lapped corrosion protection tape where rigid metal conduit (RMC) is in contact with earth. Prepare pipe with primer prior to application of tape. Follow manufacturer's application instructions.
- K. Patch concrete and asphalt cut during construction for installation of conduit to match existing in-kind.
- L. Use conduit seals to comply with NEC Article 300. Where indicated, use a conduit seal with drain. For all other applications, use a standard conduit seal. Use a non-hardening sealing compound to seal conduit seals, as required to comply with NEC Article 300.
- M. Use conduit seals on conduit leaving a classified area to comply with NEC Article 500. Use sealing cement and fiber filler to seal conduit seals, as required to comply with NEC Article 500. Do not install cement and filler until end of project following approval of Owner.
- N. Trenching Requirements:

1. Coordinate installation of underground conduits with other outside and building construction work.
 2. Do not back-fill underground conduits until they have been inspected.
 3. Warning Tapes: Bury warning tapes 12 inches below finish grade for all underground conduit runs.
 4. Where existing roadways, sidewalks, curbing, etc. are encountered, remove those sections as needed during construction and replace with new sections after back filling to match original conditions.
 5. Excavations shall be carefully made to avoid unknown underground utilities or utilities which are in a location different from that expected or shown on the Drawings.
 6. Grade trenches and place select material to provide uniform trench bottom for conduit support.
- O. Raceways utilized for fiber optic cable shall be installed in the following manner:
1. For conduits that are underground all deflections greater than 30 degrees within a 10-foot span shall be in rigid galvanized conduit, and the radius for all deflections shall be not less than 36 inches.
 2. Where the conduit run is less than 20 feet, standard radius 90 degree sweeping elbows can be used.
 3. Fiber optic cable shall not pass through any condulets that incorporate a 90-degree change of direction.
 4. Conduits shall enter any cabinet in a manner that will allow for a logical and professional installation of the fiber optic cable in the cabinet.
 5. Where fiber is installed other than underground or outdoors, it shall be installed in "lay in wireway". Wherever possible, lay the fiber cables in, do not pull into place.

3.06 CONDUIT TERMINATIONS

- A. General: Review requirements of Drawings and other sections of the Specifications regarding constraints on location of termination of conduit to enclosures.
- B. Method of Termination for RGS Conduit:
1. Dry Interior Locations: For conduit terminating to an enclosure that does not have an integral threaded hub, terminate using double bonding locknuts.
 2. Wet Interior and Exterior Locations: For conduit terminating to an enclosure that does not have an integral threaded hub, terminate conduit use a threaded conduit hub fitting (Myers hub). Use threaded conduit hub fitting regardless of location of termination on enclosure (top, sides, and bottom.)
- C. Bushings:

1. Use insulated throat grounding bushings with lay-in style grounding lug on conduit terminations, except where conduit terminates in a threaded conduit hub fitting or threaded hub integral to an enclosure.
 2. For conduit required to terminate in a threaded conduit hub fitting, use Myers-type conduit hub with insulated throat and interior bushing with integral grounding lug or screw.
- D. Caps: Use conduit caps to protect installed conduit against entrance of dirt and moisture.

3.07 HAZARDOUS (CLASSIFIED) AREAS

- A. Conduit sealing fittings shall be installed:
1. Within 18 inches of an enclosure.
 2. When entering or leaving a Class 1 hazardous area.

3.08 GENERAL CONDUIT APPLICATIONS

- A. Electrical Metallic Tubing (EMT): EMT may be used in hollow metal or wood walls and hollow building ceiling spaces of finished locations for conductors of lighting, receptacle, and alarm circuits only.
- B. Rigid Metallic Conduit (RMC):
1. Not permitted underground or concrete embedded unless protected with corrosion protection tape.
 2. Not permitted in corrosive atmospheres as defined by Engineer.
 3. On aluminum handrails, use aluminum RMC supported by aluminum or stainless-steel hardware.
 4. Steel RMC may not be used in place of PVC RMC or aluminum RMC where these types are specifically denoted on Drawings.
 5. Do not cast aluminum RMC in concrete or use it for sleeves.
 6. Aluminum RMC: Not permitted in contact with earth or concrete.
- C. Rigid Non-Metallic Conduit (RNMC): May not be used where exposed to direct sunlight.
- D. FMC:
1. Use FMC for the final connection to luminaires in lay in type ceilings.
 2. Not all such FMC runs are shown on the Drawings.
 3. No other usage of FMC is allowed unless specifically called for on the Drawings.
- E. LFMC:
1. Use LFMC for the final connection to:
 - a. Equipment that may vibrate.
 - b. Equipment or instrumentation cases or boxes.

- c. Industrial type luminaires that might be temporarily moved or disconnected for maintenance or calibration.
 - d. Not all such LFMC runs are shown on the Drawings.
- F. Type of Conduit:
- 1. The Drawings show the type of conduit required for certain runs.
 - 2. Where the type is not shown, any type listed in "SCHEDULE" may be used, subject to NEC restrictions and the above requirements.

3.09 SIZE

- A. General:
- 1. The Drawings show the minimum size required for certain conduit runs.
 - 2. Where size is not shown, comply with this specification section as a minimum.
- B. If a conduit size has to be increased because a motor or other equipment furnished by the Contractor requires more power (and therefore larger wire and conduit than shown) than the specified motor or equipment, the larger conduit shall be installed at no additional cost to the Owner.
- C. Minimum size requirements:
- 1. As required by NEC, but larger if shown on the Drawings or required below.
 - 2. Exterior pole lighting circuits: 3/4 inch.
 - 3. 120/208/240V receptacle circuits: 3/4 inch minimum.
 - 4. 120/208/240V individual branch circuits: 3/4 inch.
 - 5. 208 or 240V feeders: 3/4 inch.
 - 6. 480V circuits: 3/4 inch.
 - 7. 120V control circuits:
 - a. 3/4 inch minimum.
 - b. 3/4 inch for ten to twenty 14 AWG.
 - c. 1 inch minimum for more than twenty 14 AWG.
 - d. All others: Size by NEC for conductor number.
 - 8. Shielded or coaxial cable: 3/4 inch.
 - 9. Circuits of special systems: As shown on Drawings or as required in the specification section for the respective system.

END OF SECTION

SECTION 16123

LOW-VOLTAGE WIRE AND CABLE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish, install, connect and test all wire and cable operating at 600 volts or less.
- B. Furnish wire and cable for all systems except:
 - 1. Where supplied as part of an equipment or system.
 - 2. Where specifically stated otherwise in other parts of the specifications or on the Drawings.

1.02 RELATED WORK

- A. Section 01340: Shop Drawings, Product Data, and Samples.
- B. Section 16075: Electrical Identification.
- C. Section 16141: Wiring Devices, Connectors, and Accessories

1.03 REFERENCES

- 1. ANSI/NFPA 70 - National Electrical Code.
- 2. NEMA WC 5 - Thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy.
- 3. UL 83 - Thermoplastic-Insulated Wires and Cables.

1.04 REGULATORY REQUIREMENTS

- 1. Conform to requirements of ANSI/NFPA 70.
- 2. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.05 SUBMITTALS FOR RELEASE

- 1. Submit in accordance with Specification Section 16010: General Electrical Requirements.
- 2. Catalog Data: Include data for power and lighting wire, control wire and cable, and ground wire.

PART 2 PRODUCTS

2.01 GENERAL

- A. Conductors: Copper only.
- B. Color Coding and Marking: Conform with Specification Section 16075: Electrical Identification.

2.02 600V POWER AND GENERAL PURPOSE WIRE

- A. General:
 - 1. Conductors: Copper only.
 - 2. Color Coding: Conform with Section 16075.
- B. Power and Lighting Wire:
 - 1. NEMA WC 5, UL 83, Type THWN/THHN, minimum #12 AWG, unless otherwise noted.
 - 2. #12 AWG and #10 AWG: Solid or Class B stranded conductor.
 - 3. #8 AWG or larger: Class B stranded conductor.
- C. Control and Instrumentation Wire: NEMA WC 5, UL 83, Type THWN/THHN, #14 AWG stranded conductor, unless otherwise noted.
- D. Fixture Wires: Factory installed by fixture manufacturer and labeled for application.
- E. Ground Wire:
 - 1. Main Ground, Bonding and Raceway Conductor:
 - a. #12 AWG and #10 AWG: Solid or Class B stranded conductor; thermoplastic insulated, NEMA WC 5, UL 83, 600 V, Type THWN/THHN. Green solid color compound throughout conductor length.
 - b. #8 AWG: Class B stranded conductor; thermoplastic insulated, NEMA WC 5, UL 83, 600 V, Type THWN/THHN. Green solid color compound throughout conductor length.
 - c. #6 AWG and larger: Class B stranded conductor; bare.
 - 2. Ground Counterpoise Conductor: Class B solid or stranded conductor; bare. For required type and size, see Section 16452.
 - 3. Internal Perimeter Ground Conductor (Halo): Class B solid or stranded conductor; bare. For required type and size, see Section 16452.
- F. Manufacturer:
 - 1. Southwire Inc. or equal.

- G. Variable Frequency Drive Wire:
 - 1. Cross-Linked polyethylene (XLPE) insulation.
 - 2. Tinned copper shielded multicable with 300% symmetrical grounds per Drawings, Manufacturer's Reference Belden VFD Cable.

2.03 CONTROL WIRE AND CABLE:

- A. Single Conductors: NEMA WC 5, UL 83, Type THWN/THHN, 14 AWG stranded conductor, UL Listed, unless otherwise noted.
- B. Two 16 AWG stranded 19 x 29 tinned copper conductors, PVC insulated with overall aluminum polyester foil shield; 100 percent shield coverage; stranded 18 AWG tinned copper stranded drain wire; overall PVC jacket; color coded black and clear and numbered at one-inch intervals. Manufacturer's reference; Belden #8719.
- C. RS-485 Cable: Category 5e Ethernet cable with appropriate connectors.
- D. UL Listed.

2.04 DATA NETWORK CABLE

- A. Per TIA 568.C.2, NEMA WC-63.1 Category 5e.
- B. Four pair, 24 AWG insulated solid bare copper.
- C. Shielded unless otherwise indicated.
- D. Jacket: Low Smoke FR-PVC, polyester rip cord installed under jacket.
- E. UL Listed.

2.05 TRAY CABLE (TC)

- A. Per NEC 340, 318, 501, 725 and 760.
- B. UL Listed:
 - 1. Type TC.
 - 2. Suitable for direct burial in sizes 14 AWG and larger.
- C. Flame, moisture and sunlight resistant; meet IEEE 383 flame test at 210,000 BTU.
- D. Ratings:
 - 1. 600V.
 - 2. 90° C dry locations; 75° C wet locations.

- E. Construction:
 - 1. Conductor: stranded soft annealed copper.
 - 2. Insulation: PVC with 5 mil nylon jacket.
 - 3. Jacket: PVC.
- F. Conductor Identification:
 - 1. 8 AWG and larger: ICEA Method 4.
 - 2. 10 AWG and smaller: ICEA Table K 2, Methods 1 and 4.
- G. Manufacturer:
 - 1. Southwire Inc. "TC"
 - 2. or equal.
- H. Sometimes referred to on Drawings as "TC".

2.06 DIRECT BURIAL SIGNAL CABLE

- A. 12 each: 22 AWG solid copper conductors, each insulated with color-coded, high-molecular-weight polyethylene.
- B. Conductors twisted into six pairs with staggered pair lay.
- C. Core air space filled with PE/PJ compound.
- D. 0.006" alloy 194 copper shield (97.5% copper, 2.35% iron, 0.12% zinc, 0.03% phosphorus).
- E. Black, weather-resistant, extruded polyethylene jacket.
- F. Ratings:
 - 1. Comply with REA PE 39 requirements.
 - 2. 60° C to +80° C.
 - 3. 300 working volts.
 - 4. Resist acid, alkali, moisture and fungus.
 - 5. Suitable for direct burial.
- G. UL Listed.

2.07 SPECIAL CABLES

- A. As supplied by equipment suppliers or as required on the Drawings.

PART 3 EXECUTION

3.01 GENERAL WIRING METHODS

- A. Run wiring in raceways, unless otherwise indicated on Drawings.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work which will injure conductors has been completed.
- C. Do not install conductors in raceways until concrete and plaster work is complete.
- D. Completely and thoroughly swab raceway system before installing conductors.
- E. Pull all conductors into a raceway at the same time.
- F. Do not exceed manufacturer's maximum pulling tension.
- G. Use wire pulling lubricant for pulling building wire 4 AWG and larger.
- H. Clean exposed conductors in equipment and enclosures when wire pulling lubricant has been used.
- I. Use separate conduit for each function (AC power, DC power, analog signals, digital signals, and communication signals).
- J. Neatly train and lace wiring inside boxes, enclosures and equipment, and panelboards. Lace no more than six current carrying conductors 12 AWG and 10 AWG sizes. Lace larger sizes with no more than three conductors.

3.02 BUILDING WIRING

- A. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- B. Make conductor lengths for parallel circuits equal.
- C. For branch circuits, provide number of phase and neutral conductors required to implement circuiting, unless otherwise noted.
- D. Splice building wire only in accessible junction and outlet boxes and wireways. Do not splice in panelboards, cabinets, control panels and enclosures.

3.03 CONTROL AND INSTRUMENTATION WIRING

- A. Install control and instrument wire and cable in continuous lengths from field devices, or terminal blocks of intermediate junction boxes where so indicated on the Drawings, to terminal blocks in Control Panels and Terminal Boards. Except for installations where new cable must be spliced into an existing instrument loop or where otherwise indicated on the Drawings, do not splice instrument cable unless specifically approved.
- B. Terminate shielded cables at terminal block only, unless otherwise indicated.

3.04 CABLE INSTALLATION

- A. Bending radii: not less than permitted by ICEA or as recommended by cable manufacturer.
- B. Cable in trenches, (such as under the MCC's) handhold and manholes:
 - 1. Except for individual THWN grounding conductors, all conductors shall be TC or PLTC.
 - 2. Maintain separation between AC and DC cables.
- C. Cable Pulling:
 - 1. Reels: firmly mount on portable stand and secure against displacement.
 - 2. Use pulling grips.
 - 3. Pulling tension shall not exceed manufacturer's recommendations.
 - 4. Lubricate as recommended by the lubricant manufacturer to minimize mechanical stress that may lead to future cable faults.
- D. Splicing:
 - 1. General:
 - a. Permissible only in boxes, enclosures, or similar accessible, protected locations.
 - b. Splicing in conduit bodies not permitted.
 - c. Splicing in underground handholds and manholes not allowed unless specifically allowed in other Sections of this specification or on the Drawings, or proposed by the Contractor and allowed by the Engineer.
 - d. Splices shall be made in strict accordance with manufacturer's instructions.
 - 2. 480V Circuits:
 - a. Splicing allowed at motors: Section 16141 2.12.
 - b. Other splicing allowed only where specifically shown on Drawings, or by approval of Engineer.
 - i. If allowed: see Section 16141 2.10 and 2.11.
 - 3. 277V Lighting Circuits:
 - a. If allowed on Drawings: Section 16141 2.10 and 2.11.

- b. Otherwise, use terminal boards, same as required for control circuits below.
- 4. 120/208/240V lighting and power circuits: Section 16141 2.10 and 2.11.
- 5. Control circuits:
 - a. No splicing allowed without specific approval of Engineer.
 - b. If splicing approved, provide enclosure as approved by Engineer and terminal blocks (Section 16141).
 - c. Mark wiring as in Section 16123 3.02.
 - d. Mark terminal boards as in Section 16141.
- 6. Instrument wiring:
 - a. No splicing allowed without specific approval of Engineer.
 - b. If splicing approved, provide enclosure as approved by Engineer and terminal blocks (Section 16141).
 - c. Mark wiring as in Section 16075.
 - d. Mark terminal boards as in Section 16141.

3.05 WIRING CONNECTIONS AND TERMINATIONS

- A. Use only approved wire connectors.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Install crimp-on ring tongue terminals on all control wiring connected to terminations with screw connections. Use ratcheting crimp tool.
- D. Install crimp-on male adapter terminals on all control wiring connected to terminal blocks with pressure-type block lug connections. Use ratcheting crimp tool.
- E. Make splices, taps and terminations to carry full capacity of conductors.
- F. Terminate spare conductors with insulated wire connectors.
- G. Install wire connectors in accordance with manufacturer's instructions. Use tools and accessories recommended.
- H. Shielded Control Wire Termination:
 - 1. Open Ground Termination at Field Device: Pull cable shield and drain wire back one inch over outside jacket of cable. Cover shield and drain wire completely with heat shrink cable marker. Do not terminate drain wire.
 - 2. Open Ground Termination at Terminal Block: Pull cable shield back one inch over outside jacket of cable. Cover shield completely with heat shrink cable marker. Terminate drain wire on terminal block.

3.06 FIELD QUALITY CONTROL

- A. Torque test conductor connections and terminations to manufacturer's recommended values.
- B. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION

SECTION 16130

BOXES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Requirements for outlet boxes, pull and junction boxes, as required for a complete conduit system.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Specification Section 16010: Basic Electrical Requirements.
- B. Specification Section 16160: Cabinets and Enclosures.

1.03 REFERENCES

- A. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- B. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Devices Boxes, Covers, and Supports.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.05 SUBMITTALS FOR RELEASE

- 1. Catalog Data: Submit catalog literature and data sheets for precast underground pull boxes as specified in this section.

1.06 DEFINITIONS

- A. See Section 16010 for the definitions of Wet Interior Locations, Dry Interior Locations, Exterior Locations, Corrosive Atmosphere Locations, and Classified Locations.

PART 2 PRODUCTS

2.01 GENERAL

- A. Application: See box schedule in Part 3 for the application of the following types of boxes to this project. It should be noted that not all box types specified in Part 2 of this section will necessarily be used on this project.

2.02 OUTLET BOXES

- A. Sheet Metal Boxes:
 - 1. Surface/Free Standing: ANSI/NEMA OS 1, galvanized steel sheet metal box; rated for weight of equipment supported; include 1/2 inch male fixture studs where required; grounding terminal.
 - 2. Flush Mounted: ANSI/NEMA OS 1; galvanized steel sheet metal box with grounding terminal and square corners and straight sides for flush mounting in CMU block wall.
- B. Cast Boxes:
 - 1. ANSI/NEMA FB 1:
 - a. Type "FD" cast ferroalloy, threaded hubs, grounding terminal.
 - b. Type "FS", "FD", "WAG" or similar, cast aluminum (Weathertight).
- C. PVC Boxes: ANSI/NEMA OS 2 PVC boxes; grey color.
- D. Stainless Steel Boxes: NEMA 4X, IP65/IP66, 316 stainless steel.
- E. Submersible Screw Cover Box:
 - 1. Construction: Submersible, hot compression molded fiberglass reinforced thermoset polyester, with seamless gasket and captive 304 stainless steel screws.
 - 2. Listings: UL listed for 4X, 6P.
 - 3. Manufacturer's Reference: Crouse-Hinds FSJS.
- F. NEMA 7/9 Screw Cover Box:

1. Construction: Copper-free aluminum body. Rated for explosion proof, dust-ignition proof, raintight, water tight, wet locations.
2. Cover: Copper-free aluminum cover.
3. Listings: UL listed for Class 1, Division 1 and 2, UL 886.
4. Manufacturer's Reference: Crouse-Hinds.

2.03 PRECAST UNDERGROUND PULL BOXES

- A. Construction: One piece constructed box. Aggregate of sand and gravel bound with polymer and reinforced with continuous woven glass strands. Inner surface of heavy gel polyester resin backed by double layer of heavy weave fiberglass. Designed with non-settling shoulders positioned to maintain grade and facilitate back filling.
- B. Loading: Heavy vehicular traffic rated; designed to meet ANSI Tier 22 loading of 22,500 pounds or as noted on drawings. One piece locking cover, skid resistant surface. Logo as required for the application.
- C. Size: 36-3/4" x 23-3/4" x 24"D exterior dimensions, unless otherwise indicated.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide electrical boxes for equipment shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on the Drawings are approximate unless dimensioned.
- C. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes. Grout area between boxes and masonry unit to fill any gaps.
- D. Provide knockout closures for unused openings.
- E. Support boxes independently of conduit except for Cast Boxes that are connected to two rigid metal conduits, both supported within 12 inches of box and for boxes attached to conduit stub-ups that are within 12 inches of finished floor.
- F. Use multiple-gang boxes where more than one device is mounted together; do not use section boxes. Provide barriers to separate wiring of different voltage systems.

- G. Align adjacent wall mount outlet boxes for switches, thermostats, and similar devices with each other.
- H. Ensure that boxes installed in exterior locations are accessible.

3.02 OUTLET BOX SCHEDULE

- A. Dry Interior Locations:
 - 1. Flush Mounted Sheet Metal Box: Use for attachment to conduit concealed within the CMU wall.
 - 2. All Other Applications and Locations Not Mentioned Above: Cast Boxes.
- B. Exterior Locations: Cast Boxes.
- C. Wet Interior Locations: PVC Boxes.
- D. Corrosive Interior Atmosphere Locations: PVC Boxes.
- E. Corrosive Exterior Locations: Stainless Steel Box.
- F. Hazardous Locations: NEMA 7/9 Screw Cover Box.
- G. Underground Vault Housing Water Conveyance Equipment: Submersible Screw Cover Box.

3.03 PULL AND JUNCTION BOX SCHEDULE

- A. For pull and junction boxes with dimensions that do not exceed standard outlet boxes, use Outlet Boxes described in Part 2.
- B. For pull and junction boxes with dimensions that exceed standard outlet boxes, use Enclosures specified in Section 16160.
 - 1. Dry Interior Locations: NEMA 1 Screw Cover Enclosure.
 - 2. Exterior Locations: NEMA 3R Screw Cover Enclosure.
 - 3. Wet Interior Locations: NEMA 4X Polycarbonate Screw Cover Enclosure.
 - 4. Corrosive Interior Atmosphere Locations: NEMA 4X Polycarbonate Screw Cover Enclosure.
 - 5. Corrosive Exterior Locations: NEMA 4X Stainless Steel Hinged Cover Enclosure Type 2.
 - 6. Hazardous Locations: NEMA 7,9 Explosion Proof Hinged Cover Enclosure.

3.04 UNDERGROUND PULLBOX INSTALLATION

- A. Install pullbox per manufacturer's recommendations.

- B. Set pullbox on 6" deep gravel (1" or smaller gravel size). Line vertical sides and top of gravel area with 30 pound felt paper before placement of gravel.
- C. Use solid concrete building blocks evenly spaced around base of box for leveling.
- D. Construct top of pullbox flush with adjacent finish grade.
- E. Construct 6" wide by 8" deep concrete curb with #4 rebar ring around perimeter of pullbox to reduce settling. Use 3000 psi concrete.
- F. Grout and trim conduit into pullbox.
- G. Install bollards around pullbox, if indicated on the Drawings.

END OF SECTION

SECTION 16160

CABINETS AND ENCLOSURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Requirements for enclosures and enclosure accessories associated with Division 16 work.

1.02 REFERENCES

- A. NEMA ICS 6 - Enclosures for Industrial Control Equipment and Systems.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. UL 50 – Enclosures for Electrical Equipment.
- D. UL 508 – Industrial Control Equipment.
- E. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings

1.03 SUBMITTALS FOR RELEASE

- A. Catalog Data: Submit catalog literature and data sheets for the complete enclosure and interior components and accessories as specified in this section.

1.04 SUBMITTALS FOR CLOSEOUT

- A. Spare Parts / Maintenance Materials: Provide four cans of manufacture recommended spray touch-up paint appropriate for field repair of each type of painted enclosure specified in this section.

1.05 DEFINITIONS

- A. See Section 16010 for the definitions of Wet Interior Locations, Dry Interior Locations, Exterior Locations, Corrosive Atmosphere Locations, and Classified Locations.

PART 2 PRODUCTS

2.01 GENERAL

- A. Application: Not all enclosures specified in Part 2 of this section will necessarily be used on this project. Use enclosures as necessary to meet the requirements of the Drawings and other sections of the Specifications.

2.02 NEMA 1 SCREW COVER ENCLOSURE

- A. Construction: NEMA Type 1, UL 50 Type 1, steel, minimum 16 gauge. No knockouts.
- B. Finish: ANSI 61 gray enamel polyester powder finish inside and outside over phosphatized surfaces.
- C. Cover: Flat, removable cover fastened with removable, plated screws. Keyhole screw slots in cover.
- D. Manufacturer's Reference: Hoffman, Bulletin A90.

2.03 NEMA 3R SCREW COVER ENCLOSURE

- A. Construction: NEMA Type 3R, UL 50 Type 3R, steel, minimum 16 gage. No knockouts. Drip shield top and seam-free sides, front, and back.
- B. Finish: ANSI 61 gray enamel polyester powder finish inside and outside over phosphatized surfaces.
- C. Cover: Slip on removable cover fastened with removable, plated screws along bottom edge. Provisions for padlocking.
- D. Manufacturer's Reference: Hoffman, Bulletin A90.

2.04 NEMA 3R HINGED COVER ENCLOSURE

- A. Construction: NEMA 250; Type 3R steel.
- B. Finish: ANSI 61 gray enamel finish over galvanized steel.
- C. Covers:
 - 1. Enclosures 12"W x 12"H or smaller: Continuous galvanized steel hinge, held closed by draw pull catch with provisions for padlocking.

2. Enclosures larger than 12"W x 12"H: Continuous galvanized steel hinge, held closed by captive screws with hasp and staple provided for padlocking.

D. Manufacturer's Reference: Hoffman Bulletin A-3/A-12.

2.05 NEMA 12 WIREWAY

- A. General: Feed-through wireway with fittings and brackets to allow for specific wireway lengths and configurations.
- B. Construction: NEMA Type 12, UL 870, steel, minimum 14 gauge. No knockouts. Smooth, rounded edges on sections and fittings. External screw clamps. Oil-resistant gasket and adhesive.
- C. Finish: ANSI 61 gray polyester powder finish inside and outside over pretreated surfaces.
- D. Cover: Hinged cover fastened with heavy butt hinges.
- E. Manufacturer's Reference: Hoffman, Bulletin F20.

2.06 NEMA 3R WIREWAY

- A. Construction: NEMA Type 3R, UL 870, steel, minimum 16 gauge. No knockouts. Drip shield top and seam-free sides, front, and back.
- B. Finish: ANSI 61 gray enamel polyester powder finish inside and outside over phosphatized surfaces.
- C. Cover: Slip on removable cover fastened with captive plated screws along bottom edge.
- D. Manufacturer's Reference: Hoffman, Bulletin F40.

2.07 NEMA 4X WIREWAY

- A. Construction: NEMA Type 4X, 304 stainless steel, minimum 14 gauge. No knockouts.
- B. Finish: Natural stainless steel with a smooth brushed finish.
- C. Cover: Removable butt hinged cover secured with screw clamps.
- D. Accessories: Elbows, box connectors, cover plates, etc. as needed to complete configuration shown on Drawings.

E. Manufacturer's Reference: Hammond 1487SS Series.

2.08 NEMA 4X POLYCARBONATE SCREW COVER ENCLOSURE

A. Construction: NEMA Type 4X, UL 508 Type 4X, impact-resistant polycarbonate.

B. Finish: Manufacturer's standard light gray inside and outside.

C. Cover: Opaque, impact-resistant polycarbonate cover held in place with polyamide screws.

D. Manufacturer's Reference: Hoffman, Bulletin Q41.

2.09 NEMA 12 HINGED COVER ENCLOSURE (SCREW-DOWN LATCH)

A. Construction: Wall mount or pad mount, as indicated, NEMA Type 12, UL 508 Type 12, steel, minimum 14 gauge, with interior subpanel. No knockouts. Seams continuously welded and ground smooth. Body designed to prevent no more than 1/8" flex in any surface from one corner to another. One inch diameter cable loop welded to interior of enclosure near door hinge for attachment of cable from door to enclosure. Ground stud welded to interior sidewall of enclosure near door hinge.

B. Door: Door supported with continuous steel hinge, and 3-point latch and handle with padlock attachment. Continuous oil-resistant gasket attached with oil-resistant adhesive and held in place with steel retaining strips. Door stop to secure door in open position. Door designed to prevent no more than 1/8" deflection across surface from one corner to another. One inch diameter cable loop welded to interior of door near door hinge for attachment of cable from door to enclosure. Ground stud welded to interior of door near door hinge. Install bonding strap from ground stud of door to ground stud on enclosure.

C. Finish:

1. Enclosure Exterior: ANSI 61 gray enamel polyester powder finish over phosphatized surfaces.
2. Enclosure Interior: White enamel polyester powder finish over phosphatized surfaces.
3. Subpanel: Manufacturer's standard white enamel polyester powder finish over phosphatized surfaces.

D. Options: Interior data/print pocket.

E. Accessories: Swing-out panel for mounting of controls, indicators, etc.

F. Manufacturer's Reference: Hoffman, Bulletin A12.

2.10 NEMA 12 HINGED COVER ENCLOSURE (QUARTER TURN SLOTTED LATCH)

- A. Construction: Wall mount, as indicated, NEMA Type 12, UL 508A, steel, minimum 18 gauge, with interior subpanel. No knockouts. Seams continuously welded and ground smooth. One inch diameter cable loop welded to interior of enclosure near door hinge for attachment of cable from door to enclosure (Where required). Body grounding stud welded to interior sidewall of enclosure near door hinge.
- B. Door: Solid or window-door supported with steel hinge pins, and quarter-turn slotted latch. Continuous seamless foam gasket. One inch diameter cable loop welded to interior of door near door hinge for attachment of cable from door to enclosure (Where required). Bonding provision on door (except window-door models). Install bonding strap from ground stud of door to ground stud on enclosure.
- C. Finish:
 - 1. Enclosure Exterior: ANSI 61 gray enamel polyester powder finish over phosphatized surfaces.
 - 2. Enclosure Interior: White enamel polyester powder finish over phosphatized surfaces.
 - 3. Subpanel: Manufacturer's standard white enamel polyester powder finish over phosphatized surfaces.
- D. Options: Interior data/print pocket.
- E. Manufacturer's Reference: Hoffman, Bulletin CW1.

2.11 NEMA TYPE 3R/12 HINGED COVER ENCLOSURE

- A. Same as NEMA Type 12 Hinged Cover Enclosure (Screw-Down Latch) with the addition of a drip shield kit to achieve a NEMA 3R/12, UL 508 Type 3R12 rating.

2.12 NEMA 4 HINGED COVER ENCLOSURE

- A. Construction: Wall mount, NEMA Type 4, UL 508A, steel, minimum 14 gauge, with interior subpanel. No knockouts. Seams continuously welded and ground smooth. Ground stud welded to interior sidewall of enclosure near door hinge.
- B. Door: Door supported with continuous stainless-steel hinge, and screw-down door clamps with padlock attachment. Seamless foam-in-place gasket for water-tight seal. Bonding provisions on door interior near door hinge. Install bonding strap from door to ground stud on enclosure.

- C. Subpanel: Manufacturer's standard white enamel polyester powder finish over phosphatized surfaces.
 - D. Accessories: Swing-out panel for mounting of controls, indicators, etc.
 - E. Manufacturer's Reference: Hoffman, Bulletin A4.
- 2.13 NEMA 4X STAINLESS STEEL HINGED COVER ENCLOSURE (SCREW-DOWN LATCH)
- A. Construction: Wall mount, NEMA Type 4X, UL 508A, 316L stainless steel, minimum 14 gauge, with interior subpanel. No knockouts. Seams continuously welded and ground smooth. Ground stud welded to interior sidewall of enclosure near door hinge.
 - B. Door: Door supported with continuous stainless-steel hinge, and screw-down door clamps with padlock attachment. Seamless foam-in-place gasket for water-tight seal. Bonding provisions on door interior near door hinge. Install bonding strap from door to ground stud on enclosure.
 - C. Subpanel: Manufacturer's standard white enamel polyester powder finish over phosphatized surfaces.
 - D. Accessories: Swing-out panel for mounting of controls, indicators, etc.
 - E. Manufacturer's Reference: Hoffman, Bulletin A4S.
- 2.14 NEMA 4X STAINLESS STEEL HINGED COVER ENCLOSURE (INTERIOR PULL BOX)
- A. Construction: Wall mount, NEMA Type 4X, UL 50/50E, 316L stainless steel, minimum 14 gauge, without interior subpanel. No knockouts. Seams continuously welded and ground smooth. Bonding provisions on interior sidewall of enclosure near door hinge.
 - B. Door: Door supported with continuous stainless-steel hinge, and screw-down clamps. Seamless foam-in-place gasket for water-tight seal. Bonding provisions on door interior near door hinge. Install bonding strap from door to enclosure.
 - C. Accessories: Swing-out panel for mounting of controls, indicators, etc.
 - D. Manufacturer's Reference: Hoffman, Bulletin A51S.
- 2.15 NEMA 7/9 EXPLOSION PROOF HINGED COVER ENCLOSURE

- A. Construction: Wall mount, NEMA Type 7/9, explosionproof, dust-ignitionproof, UL 698/1203, PTB 07 ATEX 1024, copper-free cast aluminum, with interior mounting pan if required for application. No knockouts. Bonding provisions on interior sidewall of enclosure near door hinge.
- B. Door: Door supported with stainless steel hinges with stainless steel hardware, and stainless-steel cover bolts. Seamless “O” ring gasket located inside bolt circle for water-tight seal. Install bonding strap from door to enclosure.
- C. Manufacturer’s Reference: Appleton AJBEW series.

PART 3 EXECUTION

3.01 CABINETS AND ENCLOSURES SCHEDULE

- A. Dry Interior Locations:
 - 1. NEMA 12 hinged cover enclosure (screw-down latch).
 - 2. Unless noted otherwise on drawings.
- B. Exterior Locations:
 - 1. NEMA Type 3R/12 hinged cover enclosure.
 - 2. Unless noted otherwise on drawings.
- C. Wet Interior Locations:
 - 1. NEMA Type 3R/12 hinged cover enclosure.
 - 2. Unless noted otherwise on drawings.
- D. Corrosive Locations:
 - 1. NEMA 4X stainless steel hinged cover enclosure (screw-down latch).
 - 2. Unless noted otherwise on drawings.
- E. Hazardous Locations:
 - 1. NEMA 7/9 explosion proof hinged cover enclosure.
 - 2. Unless noted otherwise on drawings.

PART 4 EXECUTION

4.01 INSTALLATION

- A. Install enclosures and trim plumb.
- B. Anchor securely to framing channel mounted to wall or plywood backboard. Secure enclosure at each corner, minimum.

- C. Make conduit penetrations to maintain enclosure's NEMA rating. Use conduit hubs to terminate conduits to enclosures, regardless of location of penetration into enclosure. Do not penetrate top of enclosures in exterior or wet interior locations.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials and incidentals to install strut systems, supports and anchors.

1.02 DEFINITIONS

- A. See Section 16010 for the definitions of Wet Interior Locations, Dry Interior Locations, Exterior Locations, Corrosive Atmosphere Locations, and Classified Locations.

PART 2 PRODUCTS

2.01 METAL FRAMING CHANNEL

- A. Material: Hot-dipped galvanized or Type 316 stainless steel, as scheduled. Designed with inturred lips to allow special, spring-loaded nuts to be inserted anywhere along the channel
 1. Basic Unit Size: 1-5/8" x 1-5/8". Use back-to-back channel and half-channel where required for special applications and where specifically indicated.
 2. Spring-loaded nut and bolt made of stainless steel and designed to provide positive locking in place when tightened.
 3. Material Thickness: 12 gauge.
 4. Nuts, Bolts, and Miscellaneous Hardware: Type 316 stainless steel.
 5. Manufacturer's Reference: Unistrut or equal.

2.02 FIBERGLASS FRAMING CHANNEL

- A. Material: Pultruded glass-reinforced polyester or vinyl ester resin.
 1. Strut and hanger rod construction: linear glass strands, continuous mat laminates and corrosion resistant polyester resins simultaneously pulltruded to form a uniform, rigid, thermoset shape.
 2. Fiberglass: self extinguishing with UL 94 V O classification.

3. Hanger rod washers: stamped from pulltruded flat stock.
4. Hanger rod square nuts: made from pulltruded flat stock.
5. Hanger rod hex nuts and stout nuts: injection molded.
6. rod beam clamps and pipe straps: steel with 15 mil PVC coating and SS bolts.
7. Single strut: 1.715 x 1.76 x 0.15 wall by length.
8. Back to back strut: 1.715 x 3.52 x 0.15 wall by length.
9. Manufacturer: Allied Electrical Group Cope-Glas Strut Support System or equal.

2.03 CONDUIT AND BOX SUPPORTS

- A. Steel RMC, IMC, RNMC, and EMT:
 1. Support with:
 - a. Stainless steel clamps.
 - b. Threaded stainless steel rod and hangers.
 - c. Strut system.
 - d. By pipe hangers of aluminum or stainless steel specifically manufactured for the purpose.
 2. Flexible galvanized steel or copper perforated straps (plumber's tape) will not be acceptable.
 3. In non process indoor areas, clamps may be galvanized steel.
- B. Steel pull and junction boxes: support with stainless steel bolts and anchors.
- C. Aluminum conduit and boxes: support with stainless steel bolts and aluminum plates, clamps and hardware and/or aluminum unistrut.
- D. NEMA 4X boxes: support with stainless steel bolts and anchors or strut.

2.04 ANCHORS IN MASONRY

- A. Stainless steel Wejit bolts and hardware.
- B. Stainless steel parabolts or equal expansion bolts.
- C. Conical threaded steel inserts with a lead shield set in place with a drive punch using stainless steel bolts.
- D. Lead shields with lag bolts will not be acceptable.
- E. Toggle bolts may be used in hollow portions of masonry walls in non process indoor areas.
- F. Manufacturer: Hilti Corporation or equal.

2.05 ANCHORS IN CONCRETE

- A. Stainless steel bolts and hardware with chemical adhesive.
- B. Manufacturer: Hilti Corporation or equal.

PART 3 EXECUTION

PART 4 FRAMING CHANNEL SCHEDULE

- A. Dry Interior Locations: Metal Framing Channel – Hot-dipped Galvanized.
- B. Exterior Locations: Metal Framing Channel – Type 316 Stainless Steel.
- C. Wet Interior Locations: Metal Framing Channel – Type 316 Stainless Steel.
- D. Corrosive Atmosphere Locations: Fiberglass Framing Channel. If exposed to sunlight, use Type 316 Stainless Steel.
- E. Classified Locations: Fiberglass Framing Channel. If exposed to sunlight, use Type 316 Stainless Steel.

4.02 USAGE OF CHANNEL

- A. Do not install fiberglass strut where exposed to sunlight.
- B. Do not cast fiberglass or aluminum strut in concrete.
- C. Follow manufacturer's recommendation as to maximum loading.
- D. Do not exceed deflection stated in manufacturer's literature.

END OF SECTION

SECTION 16452

GROUNDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for grounding and bonding of communications shelters, towers, equipment and raceway.

1.02 RELATED SECTIONS

- A. Section 16123 – Low-Voltage Wire and Cable.

1.03 SUBMITTALS FOR RELEASE

- A. Catalog Data: Provide catalog data for the following:
 1. Ground rods.
 2. Ground plates.
 3. Ground bus bars.

PART 2 PART 2 – PRODUCTS

2.01 MATERIALS

- A. Ground Wire: See Section 16123.
- B. Ground Rods: Copper bonded steel ground rod, 5/8 inch diameter by 8 feet in length.
- C. Ground Plates: Solid copper, two square foot minimum, 1/16 inch minimum thick, with #2/0 AWG stranded terminated welded pigtail.
 1. Manufacturer's Reference: Erico GPECEBH.
- D. Ground Bus Bars: Solid copper or tinned copper (as required), 1/4 inch thick, pre-punched bar with insulators, galvanized steel brackets, adapters, and hardware for wall and/or tower mounting.

1. Required Bonding Points:
 - a. Cabinet Ground Bus Bar: Size bus bar to accommodate required bonding points indicated on the Drawings plus an additional 5 available bonding points.
 - b. All other Ground Bus Bars: Size bus bar to accommodate required bonding points indicated on the Drawings plus an additional 20 available bonding points.
2. Manufacturer's Reference: Andrew UGBKIT.

PART 3 PART 3 – EXECUTION

3.01 GENERAL

- A. Ground Conductor:
 1. Interior and Exterior Above Grade Bonding Jumper: #6 AWG stranded copper. Use jacketed conductors.
 2. Below Grade:
 - a. Ground Counterpoise: #4/0 AWG bare copper.
 - b. Ground Radials: #1/0 AWG bare copper.
 - c. Jumpers from equipment and ground bus bars to ground counterpoise: #1/0 AWG bare copper.
 3. Bonding to Galvanized Steel:
 - a. Use tinned copper conductors.
 - b. Do not let copper conductor come in contact with galvanized steel.
 - c. Do not install bare copper above galvanized steel where rain runoff from copper can come into contact with galvanized steel.
- B. Ground Rods:
 1. General: Install ground rod straight down if possible. An angle of up to 45° is allowed. If not possible, install ground rod in a horizontal trench, at least 30 inches deep, perpendicular to the tower, building, or ground ring to which it is connected.
 2. Burial Depth:
 - a. Typical: 24 inches below finish grade.
 - b. When Part of Ground Ring: Ground ring depth (typically 30 inches).
 3. Spacing: Minimum 8 foot and maximum 16 foot.
- C. Grounding Connections:
 1. Below Grade Connections: Exothermic connection.
 2. All Other Connections: Irreversible high-compression connector or exothermic connection. Mechanical grounding connection is acceptable in applications where irreversible high-compression and exothermic are not feasible.

3.02 GROUND COUNTERPOISE:

A. General:

1. Create ground counterpoise ring when shown on drawings.
2. Install ground conductor 30 inches deep.
3. Maintain at least 8 inch bend radius on grounding conductors.
4. Ensure all bends are not tighter than 90°.
5. Where there is less than 1 foot of topsoil at the site:
 - a. Do not use ground rods.
 - b. Encase the grounding electrode conductor in electrode encasement material such as bentonite or concrete made with graded granular carbonaceous aggregate in place of conventional sand or gravel.
 - c. Install vertical ground plates in place of ground rods at 6 to 16 foot intervals.

3.03 EXTERIOR GROUNDING

- A. Bond exterior metal objects within 10 feet of ground system using #6 AWG or larger conductor.
- B. Bond fences at corner post. Use flexible bonding conductor at gates.

3.04 OTHER GROUNDING

- A. Power System Grounding: If a new electrical service entrance is provided on the project, bond the electrical service system neutral (grounded conductor) at the service entrance equipment in accordance with the National Electrical Code (NEC) and local utility company requirements.
- B. Raceway Grounding: Provide a separate equipment grounding conductor in all raceway systems, excluding spare raceways, and unless noted otherwise. Terminate each end on a grounding terminal, lug, bus or bushing. Install bond wire from conduit grounding bushing to box or enclosure grounding terminal, lug or bus.
- C. Equipment Grounding: Bond together equipment enclosures, metal raceway systems, conduit grounding hubs, and receptacle ground connections in accordance with the NEC.

END OF SECTION

SECTION 16992

CONTROL PANELS AND PANEL MOUNTED EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Edwards Automation shall provide the services of the Process Control System Integrator (PCSI), and shall furnish all services and equipment defined herein and in other Specification Sections as listed in Article 1.02, Related Work.
Contact:
Brandy Edwards
bedwards@emationdesign.com
505-258-7474
- B. Furnish all labor, materials, equipment, and incidentals required, to install, complete and ready for operation, the panels depicted on the Drawings and on the Instrumentation Details provided.
- C. Install all enclosures as specified and necessary inside the panels as specified, and as shown on the Contract documents.
- D. Furnish the following panels and consoles shown on the Drawings and specified below, in fully complete and working order:
 - 1. Level Indication Enclosure (LIE-RES).
- E. Modify Existing RTU in pump station as described herein.

1.02 RELATED WORK

- A. The Contractor shall furnish all materials, labor, and services specified in the following Specification Sections as required ensuring a single, coordinated system is supplied:
 - 1. Division 01.
 - 2. Section 01730: Operating and Maintenance Data.
 - 3. Section 16010: General Electrical Requirements.
 - 4. Section 16993: Process Field Instruments.
- B. The Contractor shall coordinate with all equipment suppliers, mechanical subcontractor, electrical subcontractor, General Contractor and Owner operations personnel.

- C. Drawings and general provisions of the Contract, including General and Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUBMITTALS FOR RELEASE

- A. Submittals shall be prepared and transmitted to the Engineer for approval in compliance with Section 16010 of these Specifications. In addition, shop drawings shall include the following information:
 - 1. Material for all panels, instrument racks, and enclosures.
 - 2. Drawings shall be to scale and shall show the location of panel mounted devices as well as doors, louvers, and subpanels.
 - 3. Drawings shall include a panel legend and a bill of materials. The panel legend shall list and identify front of panel devices by their assigned tag numbers, nameplate inscriptions, service legend, and annunciator inscriptions.
 - 4. The bill of materials shall list devices mounted within the panel that are not listed in the panel legend and shall include the tag number.
 - 5. Set up Sheet for power phase monitors listing all possible configurable parameters and options.
- B. Wiring Diagrams
 - 1. Interconnecting Wiring Diagram
 - a. Provide interconnecting wiring diagrams showing electrical connections between equipment, consoles, panels, terminal junction boxes, and field mounted components.
 - b. Diagrams shall show component and panel terminal board identification numbers, and external wire and cable numbers.
 - c. Circuit names corresponding to the Circuit and Raceway Schedule shall be shown. Note: this diagram shall include intermediate terminations between field elements and panels (e.g., terminal junction boxes, pull boxes, etc.).
 - d. This diagram shall be coordinated with the Electrical Subcontractor and shall bear his mark showing that this has been done. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.
 - 2. Connection Diagrams
 - a. Provide connection diagrams complying with ISA S5.4.

1.04 SUBMITTALS FOR CLOSEOUT

- A. As built control panel drawings, see Section 01730.

1.05 REFERENCE STANDARDS

- A. Refer to Section 16010.

- 1.06 QUALIFICATIONS
- A. Refer to Section 16010.
 - B. The Engineer shall determine whether a product is an "Approved Equal" based upon the information listed herein and the manufacturer's data sheets regarding the models specified. Alternate equipment must meet the criteria listed herein and any additional information in the manufacturer's data sheets in order to be accepted as an "Approved Equal." Supplier must furnish five (5) working installation references for any alternate equipment along with Owner, contact, and telephone number.
 - C. Requests for equipment equal approvals must be submitted prior to the last day for bidding questions for inclusion in the addendums.
- 1.07 DELIVERY, STORAGE AND HANDLING
- A. The panels shall be mounted on wood skids four inches high. Adequate crating will be provided for the panel being shipped where a transfer from one truck to another is planned.
 - B. Accessories, drawings, instruction bulletins, etc., shall be packed and shipped with the panel.
 - C. Refer to Section 16010.
- 1.08 PROJECT/SITE REQUIREMENTS
- A. Refer to Section 16010.
- 1.09 MAINTENANCE
- A. Refer to Section 16010.
 - B. The spares listed above shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity, and temperature.
- 1.10 WARRANTY
- A. Refer to Section 16010.
- 1.11 PANEL CERTIFICATION

- A. All control panels with integral controls shall be built in accordance to N.E.C. and UL 508A standards. Provide UL 508 label for control panels.

PART 2 PRODUCTS

2.01 CONTROL PANEL GENERAL REQUIREMENTS

- A. Furnish and install the panels per Specifications and Control Panel Layout Drawings.
- B. The construction and wiring shall be in accordance with this Specification and applicable panel drawings. The panel drawings will specify the arrangement of instruments to be mounted on the front, rear, and sides of the panels.
- C. Conductors running from the field to the panels shall be continuous without splices, except at approved junction boxes. The junction boxes shall have terminal blocks with 20 percent spare terminals. Special care shall be exercised to carry grounding lines through such junction boxes with the least possible resistance. Cables entering panels shall be multiconductor. Conduit and multiconductor cables entering panels shall be sealed to prevent the intrusion of gas and moisture.
- D. All exterior panel mounted equipment shall be installed with suitable gaskets, faceplates, etc. required to maintain the NEMA rating of the panel.
- E. All panels shall be supplied with suitable nameplates which identify the panel and individual devices as required.

2.02 PANEL MATERIALS AND CONSTRUCTION

- A. The panel shall be suitable for top or bottom conduit entry as required by the Electrical Drawings. For top mounted conduit entry, the panel top shall be provided with nominal one-foot square removable access plates which may be drilled to accommodate conduit and cable penetrations. All conduit and cable penetrations shall be provided with ground bushings, hubs, gasketed locknuts, or other accessories as required to maintain the NEMA rating of the panel and electrical rating of the conduit system.
- B. Wall or Unistrut Mounted Cabinets
 - 1. Unless noted otherwise on the Contract Drawings, all indoor panels shall be a minimum of NEMA 4 and fabricated of not less than USS 14-gauge steel. All outdoor panels and indoor panels specified as having a NEMA 4X rating shall be constructed of 316 stainless steel, unless FRP is specifically indicated to be provided. All FRP panels located in direct

sunlight shall be provided with a protective coating to prevent discoloration and cracking.

2. All panels shall be as manufactured by Hoffman, or equal.

C. Finish Requirements

1. All Sections shall be descaled, degreased, filled, ground and finished. The enclosure when fabricated of steel shall be finished with two rust resistant phosphate prime coats and two coats of enamel, polyurethane, or lacquer finish which shall be applied by either the hot air spray or conventional cold spray methods. Brushed anodized aluminum, stainless steel, and FRP panels will not require a paint finish.
2. The panels shall have edges ground smooth and shall be sandblasted and then cleaned with a solvent. Surface voids shall be filled and ground smooth.
3. Immediately after cleaning, one coat of a rust-inhibiting primer shall be applied inside and outside, followed by an exterior intermediate and topcoat of a two-component type epoxy enamel. A final sanding shall be applied to the intermediate exterior coat before top Coating.
4. Apply a minimum of two coats of flat white lacquer on the panel interior after priming.

2.03 CORROSION CONTROL

- A. Panels shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Instruments Model Zerust VC; Hoffman engineering Model A-HCI; or equal.

2.04 CONTROL PANEL - INTERNAL CONSTRUCTION

A. Internal Electrical Wiring

1. Panel equipment shall be mounted and wired on or within the cabinet. Wiring shall comply with the National Electrical Code. Wiring within the panel shall be grouped together with harnesses or ducts and secured to the structure. Wiring shall be numbered in compliance with the numbering system used on the wiring and connection diagrams.
2. Power and low voltage DC signal wiring shall be routed in separate wire ways. Crossing of the two system wires shall be at right angles.
3. Power wire shall be 16 AWG Type THWN stranded and shall be insulated for not less than 600 volts unless specified otherwise. Conductors shall be of tinned copper construction. All interconnecting wiring, except for electronic circuits, shall be rated for not less than 90 degrees C.
4. Signal wire shall be 1 pair 16 AWG shielded. Conductors shall be of tinned copper construction.
5. Wire color shall be: Line Power -Black; Neutral or Common - White; AC Control - Red; DC Control- Blue; Equipment or Chassis Ground - Green;

specified externally powered circuits - Orange. Graphic light wiring (24 volt maximum at the lamp socket) may be 22 AWG if properly fuse protected and terminated in a terminal block capable of accepting No. 14 AWG field wiring.

6. Wiring shall terminate at a master terminal board, rigid type and numbered. The master terminal board shall have a minimum of 25 percent spares.
7. Terminal blocks shall be arranged in vertical rows and separated into groups (Power, AC control, DC signal, and alarm).
8. Terminal blocks shall be barrier type with the appropriate voltage rating (600 volts minimum). Terminal strips shall be provided for the purpose of connecting all control wiring and signal wiring. They shall be the raised channel mounted type as manufactured by Allen Bradley, or equal.
9. Wiring trough for supporting internal wiring shall be plastic type with snap on covers. The side walls shall be open top type to permit wire changing without disconnecting. Trough shall be supported to the subpanel by using stainless steel screws. Trough shall not be bonded to the panel with glue or adhesives.
10. Each wire shall be provided with a numbered heat shrink tubing identification markers with embossed print at both ends and the numbering shall be in accordance with the Control Panel Drawings. Identification markers shall be pretyped. Handwritten markers or paper markers will not be permitted.
11. Direct interlock wiring between equipment will not be allowed. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-in of the side panel or adjacent terminal.
12. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring trough covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the identification shall also appear on the mounting sub-panel.
13. Each panel shall have a switchable, LED interior enclosure light fixture, minimum 5 Watt in size.
14. Each panel shall have a specification grade duplex convenience receptacle mounted internally within a stamped steel device box with appropriate cover.
15. Each panel shall be provided with, for instrument power, Wiremold Company type 2100, or equal, plugmold raceway, with one outlet for each instrument plus 20 percent excess for future use.
16. A lamp test push button shall be provided on the control panel to test the indicator lamps in all the CMC switches, at the same time.
17. Each panel shall be provided with an isolated copper grounding bus for all signal and shield ground connections. Shield grounding shall be in accordance with the instrumentation manufacturer's recommendations.

18. Each panel shall be provided with a separate copper power grounding bus (safety) in accordance with the requirements of the National Electrical Code.
 19. Each panel, where applicable, shall be provided with analog signal isolation (I/I) where analog signals are sent from one panel or console to another.
 20. Each panel shall be provided with surge suppression protection (electrical transients) for connections between AC power systems and electrical and electronic equipment. Surge suppressor grounding shall be in accordance with the manufacturer's recommendations.
 21. All wiring to hand switches and the like which are live circuits independent of the panel's normal circuit breaker protection shall be clearly identified as such.
- B. Relays shall be mounted in their respective panel and shall be clearly identified as being live circuits independent of the panel's normal circuit breaker protection.
 - C. Nameplates shall be provided for flush mounted equipment. The nameplates shall be approximately 1-in x 3-in constructed of black and white laminated, phenolic material having engraved Helvetica letters approximately 1/4-in high, extending through the black face into the white layer. Nameplates shall be beveled and attached to panels by self-tapping stainless-steel screws. Adhesive bonded or glued on name plates shall not be accepted.
 - D. Print storage pockets shall be provided on the inside of each panel. Its size shall be sufficient to hold all of the prints required to service the equipment.
 - E. Hinged doors shall have continuous hinges of stainless-steel construction and three-point latching system with lock. Locks for each local panel provided under this Contract shall be keyed alike. All hinged doors shall be gasketed.
 - F. Panels shall be factory tested prior to shipment. Field installation shall consist only of setting the panel in place and making necessary electrical and conduit connections.
 - G. Components shall be mounted in a manner that shall permit servicing, adjustment, testing and removal without disconnecting, moving, or removing any other component.
 - H. Components shall be mounted on plates on the inside of panels in such a manner that allows for removal of the components without removal of the plate. Components shall not be mounted directly to the enclosure.
 - I. Internal components shall be identified with suitable plastic engraved name plates attached with stainless steel drive pins adjacent to (not on) each component identifying the component in compliance with the Drawings, Specifications, and

System Supplier's data. Adhesive bonded or glued on nameplates shall not be accepted.

2.05 TERMINAL BLOCKS

- A. Single Conductor Terminal Block: DIN-rail mounted, nominal 6mm, 300 V (minimum), 28 A (minimum), capacity for #22 to #10 AWG conductor, single level, screw terminal, with computer printed marking tags. Ungrounded, grounded, or distribution type as applicable to application.
- B. Multi-Conductor Terminal Block: Same as Single Conductor Terminal Block, except multi-level. Ungrounded, grounded, or distribution type as applicable to application.
- C. Switched Terminal Block: DIN-rail mounted, nominal 6mm, 300 V (minimum), 30 A (minimum), capacity for conductor up to #10 AWG, single level, screw terminal, with computer printed marking tags and switch between input/output terminals.
- D. Fused Terminal Block: DIN-rail mounted, nominal 6mm, 300 V, ampacity required for application, capacity for #22 to #10 AWG conductor, single level, screw terminal, with computer printed marking tags and fuse between input/output terminals.
- E. Circuit Breaker Terminal Block: DIN-rail mounted, 300 V, ampacity required for application, capacity for conductor up to #10 AWG, screw terminal, and circuit breaker between input/output terminals.
- F. Accessories: Provide end stops, end sections, jumper bars, and accessories as required for application.

2.06 WIRE DUCT

- A. Rigid PVC, slotted wall, Snap-On cover, UL flammability rating 94V-0.

2.07 REMOTE TELEMETRY UNIT (RTU)

- A. RTU
 - 1. Existing RTU is a SCADAPack PLC, add configurable input and output expansion board 5401 and integrate analog and digital field signals as shown on drawings.
- B. Startup and Training

1. Manufacturer's representative will provide equipment startup, commissioning, and training per Section 16010: General Electrical Requirements.

2.08 TANK LEVEL INDICATION ENCLOSURE (TLIE):

- A. Tank level indication enclosure shall be provided as fully functional and configured unit including 50% spare terminal blocks.
- B. Provide UL 508A Listed Tank Level Indication Enclosure (TLIE) with the following components:
 1. NEMA 4 or 4X enclosure with main circuit breaker disconnect, terminal blocks, and backplane with din rail.
 2. 120V Surge Suppression, SOLA STV25K or Engineer approved equal.
 3. 24 VDC power supply SOLA SDN or Engineer approved equal.
 4. Signal Line surge protection Bourns Model 1669 or Engineer approved equal.
 5. NEMA 4X panel mount display with 4-20mA output and relay outputs, ProVu PD 6000 or Engineer approved equal.
 - a. The 4-20mA level signal will be repeated to the RTU.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The panels and equipment shall be installed at locations as shown on the Drawings.
- B. Refer to Section 16010.

3.02 TESTS (GENERAL)

- A. Panels and panel assemblies shall be tested for proper operation at the Contractor's factory prior to the shipment of any panel to the Jobsite.
- B. Refer to Section 16010.

END OF SECTION

SECTION 16993

PROCESS INSTRUMENTATION AND CONTROLS – FIELD INSTRUMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Edwards Automation shall provide the services of the Process Control System Integrator (PCSI), and shall furnish all services and equipment defined herein and in other Specification Sections as listed in Article 1.02, Related Work.
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- B. All materials, equipment, labor, and services required to achieve a fully configured, integrated, and operational process control system shall be provided. The PCSI shall design and coordinate the field instrumentation system for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications.
- C. Auxiliary and accessory devices necessary for system operation or performance to interface with equipment provided by other Suppliers under other Sections of these Specifications and shall be included whether they are shown on the drawings or not. These devices include, but are not limited to, transducers, current isolators, signal conditioners, or interposing relays.
- D. In order to ensure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained. The PCSI shall include field instrumentation ranges as necessary when submitting new instruments for Engineer's approval. The PCSI is responsible for calibrating instruments that interface with the new equipment. System design shall allow removing individual devices from service without disrupting other devices in service. In order to ensure compatibility among all equipment, it shall be the responsibility of the PCSI to coordinate all interface requirements with mechanical and electrical Contractors, Owner operations personnel and furnish any signal isolation devices that might be required.
- E. Equipment shall be fabricated, assembled, installed, and placed in proper operating condition in full conformity with detail Drawings, specifications,

engineering data, instructions and recommendations of the equipment manufacturer as approved by the Engineer.

- F. To facilitate the Owner's future operation and maintenance, products shall be by the same major instrumentation manufacturer, with panel mounted devices of the same type and model as far as possible.
- G. Equipment removed in the course of this work shall remain the property of the Owner.
- H. All equipment and installations shall satisfy applicable Federal, State, and local codes.
- I. Omission of a specific electrical or electronic item obviously necessary for the proper functionality of the equipment shall not relieve the PCSI of the responsibility of furnishing and installing the item at no additional cost to the Owner.
- J. To supplement this Section, the Drawings and the related Specification Sections provide additional details showing panel elevations, instrument device schedules, functional requirements of the system, and interaction with other equipment.
- K. All materials, equipment, labor, and services necessary to achieve the monitoring and control functions described herein shall be provided in a timely manner such that the monitoring and control functions are available when the equipment is ready to be placed into service.
- L. The PCSI shall coordinate and schedule all required testing with the Engineer.
- M. The PCSI shall coordinate and schedule all required Owner training.
- N. The equipment and services provided under this contract will include:
 - 1. Provide all labor, materials, field instrumentation, installation, calibration, testing, training, etc., and terminations for all connections between the field instruments, Master Process Control Panel (MPCP), and the plant Operator Interface Terminal (OIT).
 - 2. The PCSI shall provide all required field instrumentation, transducers, current isolators, signal conditioners, interposing relays, etc. whether shown on the contract drawings or not. It is the PCSI's responsibility to field investigate any and all interface requirements, locations, wiring, terminations, etc. to provide a complete, and fully configured, integrated, and operational process control system.
 - 3. The Contractor shall calibrate all instruments provided during project and shall provide an updated list of all ranges to the Engineer.
- O. This Section covers the furnishing, installation, and services for all primary field instruments and control equipment not specified elsewhere.

P. Refer to Instrumentation General Provisions, Section 16010.

1.02 RELATED WORK

A. Refer to Section 16010.

B. Drawings and general provisions of the Contract, including General and Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUBMITTALS

A. Refer to Section 16010.

1.04 REFERENCE STANDARDS

A. Refer to Section 16010.

1.05 QUALITY ASSURANCE

A. Refer to Section 16010

B. The Engineer shall determine whether a product is an "Approved Equal" based upon the information listed herein and the manufacturer's data sheets regarding the models specified. Alternate equipment must meet the criteria listed herein and any additional information in the manufacturer's data sheets in order to be accepted as an "Approved Equal" Supplier must furnish five (5) working installation references for any alternate equipment along with Owner, contact, and telephone number.

1.06 MAINTENANCE AND TEST EQUIPMENT

- A. Provide the following complete with carrying cases, patch cords, etc.
 - 1. One hand held smart transmitter calibrator provided by the transmitter manufacturer to calibrate all smart field transmitters provided.
- B. Spare Parts
 - 1. Field and Panel Mounted Equipment:
 - a. None
 - 2. Miscellaneous Spare Parts:
 - a. One year's supply of items recommended by the manufacturer of the equipment for each component.
 - 3. The spares listed above shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity and temperature.
 - 4. Provide other spare parts as indicated on the individual device specifications.

1.07 POTABLE WATER CERTIFICATION

- A. All process instrumentation to be in direct contact with the potable water process shall be certified as NSF standard 61 compliant by an approved Water Quality Association laboratory.

PART 2 PRODUCTS

2.01 General

- A. Process Control System
 - 1. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Electrical Drawings, to comply with the National Electrical Code.
 - 2. All indicators and recorder read-outs shall be linear in process units, unless otherwise noted.
 - 3. Electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose to assure optimum long term performance and dependability over ambient atmosphere fluctuations and 0 to 95% percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

4. All instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals which are established standards for the water and wastewater industries.
5. All electronic instrumentation shall be of the solid-state type and shall utilize linear transmission signals of 4 to 20 mA dc (milliampere direct current), however, signals between instruments within the same panel or cabinet may be 1-5V dc (volts direct current), or the like.
6. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.
7. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks as shown on the Drawings or as required.
8. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Electrical Drawings, to comply with the National Electrical Code.
9. All indicators and recorder readouts shall be linear in process units, unless otherwise noted.
10. All transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to two percent.
11. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
12. The field mounted digital system equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

2.02 FLOW INSTRUMENTS

- A. Open Channel Flow Meter
 1. Open Channel Flow Element
 - a. Type:
 - i. Ultrasonic Level Sensor, manufacturer's reference TIENet 310, no substitutions.
 - b. Accessories/Options Required:
 - i. Factory calibration - All meters shall be factory calibrated. A copy of the report shall be in the O&M manual.
 2. Converter/Transmitter:
 - a. Input Power: 120 VAC.
 - b. Output Signal: 4-20 mA proportional to flowrate over specified range.
 - c. Output load: 600 Ohms, maximum.

- d. Totalizer: 0 to 50 pulses per second, scaleable to any unit.
- e. Integral digital indicator scaled in process units.
- f. Calibrated range:
 - i. Meter: 0 to design flow plus 50%, rated in gpm
- g. Accuracy - Plus or minus 0.5 percent of reading over the flow range.
- h. Element-to-Transmitter Cable: Provide cable as required by field routing conditions.
 - i. Electrical Connections: Screw terminals for instrument cable.
- i. Data logger and physical storage media include accessories and software for data retrieval.
- 3. Accessories: Sun Shield
 - a. Material: Sheet aluminum.
 - b. Dimensions: As shown on drawings.
- 4. Manufacturer:
 - a. Isco Signature.
 - b. Engineer approved equal.

B.

2.03 LEVEL INSTRUMENTS

- A. Type: Level (Ultrasonic) Transmitter
- 1. Provide level transmitter meeting the following requirements:
 - a. Type: Ultrasonic.
 - b. Range: As required for application.
 - c. Beam Diameter: 3 inches.
 - d. Accuracy: +/- 0.2% of maximum range.
 - e. Resolution: 0.079 inches.
 - f. Dead Band: 8 inches.
 - g. Supply Voltage: 18-28 VDC (loop).
 - h. Loop Resistance: 250 ohms max at 24 VDC.
 - i. Signal Output: 4-20 mA, two wire.
 - j. Signal Invert: 4-20 mA or 20-4 mA.
 - k. Calibration: Pushbutton.
 - l. Process Temp: -4° to 140° F.
 - m. Electronics Temp: -40° to 160° F.
 - n. Pressure: 30 psi.
 - o. Enclosure Rating: NEMA 4X.
 - p. Enclosure Material: Aluminum.
 - q. Transducer Material: PVDF.
 - r. Process Mount: 2" NPT.
 - i. Accessories: Manufacturer's 2" NPT mounting bracket.
 - s. Conduit Entrance: ½" NPT.
 - t. Classification: Explosion proof.

- u. Approvals: Class 1, Division 1, Groups A, B, C, D; Class II/III, Division 1, Groups E, F, G.
 - v. Manufacturer's Reference: Flowline LU83-5101.
- B. Level Float Switch
- 1. Level Element
 - a. Type:
 - i. Tilt actuated, hermetically sealed, axial non-position sensitive mechanical switch. NSF 61 rating for potable water applications.
 - b. Operational Functional:
 - i. Range – 7” to 21” switch angle.
 - ii. Temperature Limits - 32 degrees F to plus 160 degrees F.
 - c. Physical:
 - i. Non-corrosive PVC float casing.
 - ii. SJOW cable insulation.
 - iii. Form C Contact.
 - d. Options/Accessories:
 - i. The manufacturer shall be responsible for assuring that the level transducer will work in the application required.
 - ii. The CONTRACTOR shall be responsible for coordinating all sensor mounting requirements and shall furnish dimensional and elevation drawings to ensure a proper and satisfactory installation.
 - e. Manufacturers:
 - i. ITT Centripro SJE Signal master A2N Series
 - ii. or Approved equal

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. Field Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- B. The instrumentation installation details on the Drawings indicate the designed installation for the instruments specified.

- C. All work shall be executed in full accordance with local codes, regulations and ordinances.
- D. All equipment used in areas designated as hazardous shall be designed and installed for the Class, Group, and Division as required on the Electrical Drawings for the locations.
- E. All piping to and from field instrumentation shall be provided with necessary unions, test tees, couplings, adapters, and shut-off valves.
- F. Field instruments requiring power supplies shall be provided with local electrical shutoffs and fuses as required.
- G. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.
- H. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment but in no case shall more than one ground point be employed for each shield.
- I. Lifting rings from cabinets/assemblies shall be removed. Hole plugs of the same color as the cabinet shall be provided for the holes.
- J. The PCSI shall coordinate the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Engineer's approval. The PCSI shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to ensure a satisfactory functioning installation. The PCSI shall schedule and coordinate all work under this Section with that of the electrical work specified under applicable Sections of Division 40.

3.02 TESTS (GENERAL)

- A. All tests shall be conducted in accordance with prior Engineer-approved procedures, forms and checklist. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.
- B. Copies of these sign off test procedures, forms and checklists will constitute the required test documentation.
- C. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures.

- D. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- E. The PCSI shall furnish the services of servicemen, all special calibration and test equipment and labor to perform the field tests

3.03 CORRECTION OF DEFICIENCIES

- A. All deficiencies in work and/or items not meeting specified testing requirements shall be corrected in order to meet specification requirements at no additional cost to the Owner.
- B. Testing, as specified herein, shall be repeated after correction of deficiencies is made until the specified requirements are met. This work shall be performed at no additional cost to the Owner.

END OF SECTION

SECTION 16994

PROCESS CONTROL DESCRIPTION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Edwards Automation shall provide the services of the Process Control System Integrator (PCSI), and shall furnish all services and equipment defined herein and in other Specification Sections as listed in Article 1.02, Related Work.
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505-258-7474
- B. Scope
1. The Process Control System Integrator (PCSI) shall furnish control strategy diagrams, configuration sheets and control strategy descriptions as shown, specified, and required to configure the system complete and operational.
 2. The PCSI or their factory-trained field representative shall perform all programming, configuration and tuning of the control system.
 3. Attention is drawn to the requirement that all instrumentation and control equipment specified herein shall be furnished by the same System Supplier who shall provide all other related equipment as specified in Section 16992: Control Panels and Panel Mounted Equipment.
- C. This Section describes all of the anticipated control programming under this Contract. The control strategies are generally divided by the responsible Supplier and further subdivided by panel.
- D. Process Control Functions:
1. Process control function shall be structured to permit the realization of all control strategy requirements. In addition, each control function shall be designed so that bump less, balance free transfers are obtained during operating mode changeover and initialization. Where applicable, user-changeable parameters shall be automatically defaulted to a preset value if a specific value is not given during system generation.
 2. The P&IDs represent the required process monitoring and control. The required control for the system is a combination of the representation on the P&IDs and the requirements specified herein. The P&IDs do not show all the required internal diagnostic indications. In addition, to the

indications shown on the P&IDs the following, at a minimum shall be provided:

- a. Indication of bad quality on any hard-wired input/output point (such as zero milliamps on a 4 to 20 mA DC circuit).
 - b. Individual PLC fault indications.
 - c. Indication of the PLC and network communications failures.
 - d. For all motor start and stop commands check for run feedback after adjustable time delay (0 to 30 seconds). Provide a “FAIL TO START” and “FAIL TO STOP” alarm if unit fails to run or stop. Use the bad start or stop bit to remove the run command from the control logic.
 - e. For analog control loops, when control of field equipment is not in “COMPUTER,” the associated PID controller output shall track the position feedback.
 - f. Daily and continuous runtimes shall be provided for all pieces of equipment.
 - g. For all liquid level analog signals, provide the following alarm indications:
 - i. “HIGH-HIGH.”
 - ii. “HIGH.”
 - iii. “LOW.”
 - iv. “LOW-LOW.”
 - v. “HIGH AND LOW RATE OF CHANGE.”
 - h. Run Status of all motors.
 - i. Status of all field selector switches.
 - j. Indication of a communication failure.
 - k. Restart: All equipment and motors shall be automatically restarted after power failure by the control system in this Section.
3. In addition to the indications shown on the P&IDs, the following shall be provided at a minimum:
- a. Analog Data Scaling: This control function shall scale all analog inputs to a common span and shall normalize the digital representation of each analog input to a percent of the operating span. The processed value shall be expressed as a binary number that specifies the analog input’s position on a straight line lying between zero and full scale as defined for a given input by the zero span values in the data base.
 - b. Amplitude Limit Check: This control function shall perform dual level, high/low amplitude limit checking and shall identify a limit violation every time a measured or virtual variable goes out-of-limits and returns back into limits. The control function shall determine the time at which each limit excursion occurred. A dead band shall be provided on each limit and shall be expressed as a percentage of span or in engineering units. Low and high limiting default values will be set-up for each measured or calculated variable used in the process control loops.

- c. Engineering Unit Conversion: This control function shall convert scaled analog data to engineering units by means of the following equation:
 - d. $Y = (H - L) (D/DH) + L$
 - e. Where:
 - f. Y = Value in engineering units.
 - g. H = High Value of span, expressed in engineering units.
 - h. L = Low Value of span, expressed in engineering units.
 - i. D = Digitized scaled input value in counts.
 - j. DH = Full scale digitized value in counts.
 - k. Manual Control: It shall be possible for the Operator to interrupt any sequence, loop or automatic operation and operate the same manually through the Operator Workstation or Operator Interface Panel (OIP).
 - l. Verification of Digital Outputs: This control function shall verify that the equipment has responded to the digital commands before proceeding to next step during automatic operation. If any discrepancy is detected, an alarm will be annunciated.
 - m. Hardware: Supplier shall provide all the hardware, as shown, specified, or required to implement the control strategies as described.
 - n. Configuration: All set points, tuning parameters and engineering scales etc. shall be documented for each control point and each control strategy on configuration sheets or similar documents. These documents shall be updated during Factory Testing and finally configured during Operational Readiness Testing.
 - o. Control Strategy Displays: Control strategy displays shall be submitted for review. Displays shall clearly show initial conditions, start, and progression of the control strategies. Each control strategy shall be displayed in a minimum number of displays for ease of monitoring by the Operator.
 - p. Plant Power Failure: Plant equipment controlled by the control system shall be programmed to automatically reset upon failure in a controlled or orderly fashion.
 - q. Power Loss Restart: All equipment and motors shall be automatically restarted after power failure by the control system.
 - r. All relays, tuning parameters, scales, configuration values, mathematical constants, equations and set points given in the control strategies are adjustable over a wide range. The values given are initial and may change during Submittal review and may have to be readjusted during start-up.
4. The control strategies are written descriptions of the basic configuration and/or programming required to implement regulatory and sequential control of the unit processes as shown on the P&IDs. They do not in all cases describe the process characteristics fully. Finalizing and tuning of strategies, as required, by process characteristics shall be accomplished

during start-up. Control strategies shall fully reside in the memory of the designated control unit. The process inputs/outputs referred to in the Control Strategies are shown on the P&IDs. Any additional I/O (Maximum 20 percent) required shall be added during Shop Drawing review. It shall be provided at no additional cost to the Owner.

1.02 SUBMITTALS FOR RELEASE

- A. Control Strategy Displays: Submit control strategy displays as required in Part 1.01. Displays shall clearly show initial conditions, start, and progression of the control strategies. Each control strategy shall be displayed in a minimum number of displays for ease of monitoring by the Operator.

1.03 SUBMITTALS FOR CLOSEOUT

- A. Generate commissioning checklist to verify proper operation of equipment installed. Submit completed commissioning checklist.
- B. Generate and submit report summarizing final commissioning results.

PART 2 PRODUCTS

2.01 SYSTEM CONFIGURATION GUIDELINES

- A. The PCSI is responsible for providing all applications programming and configuration services to accomplish the control and monitoring functions as described herein and the Contract Documents.
- B. Graphic Displays
 - 1. All displays shall incorporate references to both instrumentation tag numbers and plant equipment numbers. All displays shall be logically arranged so that an operator can drill down into the system with overview displays leading to process displays, then specific equipment displays, then to setpoint display for the specific equipment. Additionally, the PCSI shall provide a method to allow an operator to navigate from any display in the system to any other display in the OIP with no more than two selections.
 - 2. Unless specifically noted, all timers, setpoints, alarm actuation levels, etc., shall be adjustable from the operator interface. No changes shall be made to the system through the operator interface without the entry of a password. The PCSI will enable and configure passwords on all systems as directed by the Owner.

3. Index Displays - These displays shall provide an alpha-numeric listing of every display on the system, thus allowing an operator access to any system-wide display with a single action.
4. Plant Process Control Overview Display - This display shall provide a graphical overview of the entire process system. The operator shall have the ability to highlight on the graphical elements of the overview and navigate directly to that specific process element or location. All major graphic displays shall be accessible from the Plant Overview Display.
5. Individual Device Control Detail Displays - This display type shall provide specific information and allow control on a single process device or group. The display shall depict basic process diagrams with representative symbols for equipment, levels, flows, etc., combined with real time process variables or conditions. The displays shall be dynamic (i.e., symbols for a motor shall change color indicating run or stop or alarm, the volume of tanks shall be indicated by varying the height of the interior color of the tank symbol, etc.). All the current data in the database shall be available for graphic displays. All process variables shall be displayed on their associated display(s) with correct engineering units. Process variables shall display their associated data quality flags.
6. Alarm Summary Display - The display shall consist of all points currently in alarm and shall include the tag number, description, time of occurrence, and present status (high, low, normal, etc.). The alarm summary shall identify alarm points by severity by utilizing distinct colors for each severity category.
7. System Diagnostic Displays - The displays shall summarize the error status of all system devices capable of reporting errors (i.e., PLCs, etc.). The display shall indicate if an error is detected or a failure occurs. Status of primary and backup devices shall be indicated on display.

C. Alarm/Equipment Status Reporting

1. The alarm log shall display all alarms as they occur. The alarm message shall include the time of occurrence, tag name, tag number, and whether it is a low, high, or failure alarm. When the point in alarm returns to normal, the time, point identification number, and return to normal data shall be displayed. All reports shall include the plant equipment number of the associated device.
2. The equipment status shall be logged whenever a change in status occurs (i.e., start, stop). The equipment status log shall include the time, equipment name, tag number, and the particular change in status.
3. The alarm log shall be retrievable by simple commands such that an alarm shall be reviewable for up to 3 days. The intent of this requirement is to assist with trouble shooting efforts after an alarm condition has been.

D. Control Programming

1. Provide programming and testing for all new equipment and functionality being added under this project. Refer to drawings, specifications, and loop narratives.

2. Provide programming and testing for all pumps and equipment under this project. Refer to drawings, specifications, and I/O list.
3. Provide address map to Owner to assist with the interface to the Process Control Panel. All indication and control required by the SCADA system will be provided.

PART 3 EXECUTION

3.01 GENERAL ELEMENT DESCRIPTIONS

A. General Alarms

1. The following alarms shall be provided for all devices described whether the alarm described herein is shown on the individual loop drawings or not.
 - a. Provide a discrepancy alarm for all controlled devices such as pumps, motorized equipment or any device controlled by the PLC that generates a start/stop, on/off, and discrete feedback signal. The alarm shall be generated in the PLC when a device receives a start/stop or on/off discrete command signal from the PLC and the device feedback state does not match the commanded state within a preset time. The equipment discrepancy alarm generated by the PLC shall be displayed and alarmed at the OIP, and the device shall be issued a command to stop. If a device feedback state does not match the commanded state at any other time, equipment discrepancy alarm shall be generated by the PLC. The equipment discrepancy alarm generated by the PLC shall be displayed and alarmed at the OIP, and the device shall be issued a command to stop. After a discrepancy alarm occurs, the device cannot be started again until the operator at the OIP has issued a reset.
 - b. A discrepancy alarm shall be provided for all analog signals generated in the PLC or at the OIP (such as a high-level alarm). The alarm shall be generated when the analog points value exceeds or drops below the alarm limit value. The equipment discrepancy alarm generated by the PLC shall be displayed and alarmed at the OIP. To eliminate excessive alarm reporting, the analog point shall remain in alarm until the analog points value returns beyond the limit set by the analog limit dead band.
 - c. For all analog points (such as level, flow, etc.), if the PLC detects a loss of signal, an alarm shall be generated at the OIP.
2. All alarm and control set points shall be adjustable by the Operator even if not shown on the drawings. However, these set points shall be password protected to allow access to personnel designated by the Owner.
3. If equipment and/or devices are labeled "future," programming (PLC and OIP) shall be included as part of this contract where indicated.

- B. Control Programming
 - 1. All tuning parameters for any and each PID in the PLC shall be available at the OIP for monitoring and adjustment even if not shown on the loop drawings. Tuning trends shall be provided to monitor the PID functions. However, these parameter settings shall be password protected to allow access only to personnel designated by the Owner.
 - 2. The PID controller shall be designed so that setpoint overshoot shall be no more 5%, and steady state error shall be zero (0).
 - 3. All alarm and control set points shall be adjustable by the Operator even if not shown on the drawings. However, these set points shall be password protected to allow access to personnel designated by the Owner.
 - 4. If equipment and/or devices are labeled "future," programming (PLC and OIP) shall be included as part of this contract where indicated.

- C. Totalizers
 - 1. All flows shall be totalized in the PLC. Yesterday's total flow, today's total flow, and the month's total flow shall be indicated at the OIP even if not shown on the loops. The total flows shall have the ability to be reset from the OIP. However, this reset shall be password protected to allow access only to personnel designated by the Owner.

3.02 FUNCTIONAL DESCRIPTION

- A. Add high level alarm from float switch.
- B. Add analog water level, scaled for reservoir depth.
 - 1. Add high level alarm just below level of float switch, per Operator direction.
 - 2. Add low level alarm at level per operator direction.
- C. Add instantaneous and totalized flow.

3.03 GRAPHIC DISPLAY PROGRAMMING

- 1. Add signals and alarms to Existing SCADA to match existing graphics per drawings.
- 2. Remove defunct signal and alarm tags from existing SCADA.

END OF SECTION



**GEOTECHNICAL ENGINEERING REPORT
AZTEC RESERVOIR NO. 1
NEW TOWER
AZTEC, NEW MEXICO**

Submitted To:

Nisa Rascon, P.E.
Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, New Mexico 87109

Submitted By:

GEOMAT Inc.
915 Malta Avenue
Farmington, New Mexico 87401

June 28, 2022
GEOMAT Project 222-3931



915 Malta Avenue ♦ Farmington, NM 87401 ♦ Tel (505) 327-7928 ♦ Fax (505) 326-5721

June 28, 2022

Nisa Rascon, P.E.

Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, New Mexico 87109

RE: Geotechnical Engineering Study
Aztec Reservoir No. 1
New Tower
Aztec, New Mexico
GEOMAT Project No. 222-3931

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for the proposed New Reservoir Tower to be located at the City of Aztec Reservoir No.1 in Aztec, New Mexico. This study was performed in general accordance with our Proposal No. 202-01-07 REV. 1, dated September 2, 2021.

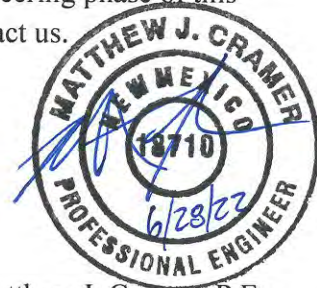
The results of our engineering study, including the geotechnical recommendations, site plan, boring records, and laboratory test results are attached. Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, we are presenting recommendations for supporting the proposed reservoir tower on a spread-type mat foundation bearing on native gravel and cobbles. Other design and construction details, based upon geotechnical conditions, are presented in the report.

We have appreciated being of service to you in the geotechnical engineering phase of this project. If you have any questions concerning this report, please contact us.

Sincerely yours,

GEOMAT Inc.

Douglas N Hood
Douglas N. Hood *BYJN*
Staff Professional



Matthew J. Cramer, P.E.
President

Copies to: Addressee (1) (via E-mail)

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Important Information About This Geotechnical Engineering Report (Taken From GBA)

**GEOTECHNICAL ENGINEERING REPORT
AZTEC RESERVOIR NO. 1
NEW TOWER
AZTEC, NEW MEXICO
GEOMAT PROJECT NO. 222-3931**

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for the New Reservoir Tower for Aztec Reservoir No.1 located in Aztec, New Mexico, as shown on the Site Plan in Appendix A.

The purpose of these services is to provide information and preliminary geotechnical engineering recommendations about:

- subsurface soil conditions
- groundwater conditions
- lateral soil pressures
- earthwork
- foundation design and construction
- drainage

The opinions and recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and experience with similar soil conditions, structures, and our understanding of the proposed project as stated below.

PROPOSED CONSTRUCTION

We understand that the existing tower will be replaced with a new structure during the Reservoir No. 1 Rehabilitation project. We anticipate it will be a cast-in-place concrete construction with an expected weight less than 210,000 lb and supported on a mat foundation. The depth of the structure is unknown at this time but based upon as-built of the existing tower the top of the new foundation is anticipated to be approximately 5 feet below the bottom of the reservoir or roughly 30 feet below the top of the existing berms. Available drawings of the existing tower indicate that it was supported on a mat foundation that was 21 feet square. We assume that the new tower will be supported in a similar manner. In addition, we understand that the project will include a concrete access drive with retaining walls. We anticipate that the retaining walls will be constructed with spread footings supported on engineered fill.

Our subsurface exploration was conducted outside of the existing reservoir rather than in the location of the proposed tower due access limitations and standing water within the existing reservoir. A previous study (GEOMAT Project No. 191-3229 dated February 22, 2019) that

included hand augering within the reservoir was also reviewed as a part of this project. A copy of that report is included in Appendix C. The recommendations provided herein for support of the new tower are based upon inferences from our exploration outside of the reservoir and from our review of the 2019 report and should be considered preliminary. However, the conditions we have inferred to exist should be confirmed by GEOMAT once the reservoir is accessible, either prior to or during construction, so that we can finalize and/or modify the recommendations as appropriate based upon the findings.

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff professional, a subsurface exploration program, laboratory testing, and engineering analyses.

Field Exploration:

Subsurface conditions at the site were explored on February 18 & March 1, 2022 by drilling one exploratory boring and excavating one test pit at the approximate location shown on the Site Plan in Appendix A, on the outside of the fenced in area of the reservoir.

The boring was advanced using a CME-55 truck-mounted drill rig with continuous-flight, 7.25-inch O.D. hollow-stem auger on February 18, 2022. The planned depth of the boring was 45 feet below existing grade but the boring was terminated short of its planned depth due to auger refusal on gravels and cobbles. The boring was continuously monitored by a staff professional from our office who examined and classified the subsurface materials encountered, obtained representative samples, observed groundwater conditions, and maintained a continuous log of each boring.

In order to explore deeper, a test pit was excavated using a Hyundai 210 LC-7 Excavator with a 32-inch bucket on March 1, 2022. The test pit was continuously monitored by a professional from our office who examined and classified the subsurface materials encountered, obtained representative samples, observed groundwater conditions, and maintained a continuous log of the test pit.

Soil samples were obtained from the boring using a combination of standard 2-inch O.D. split spoon and 3-inch O.D. modified California ring barrel samplers. The samplers were driven using a 140-pound hammer falling 30 inches. The standard penetration resistance was determined by recording the number of hammer blows required to advance the sampler in six-inch increments. Representative bulk samples of subsurface materials were also obtained.

Groundwater evaluations were made in each boring at the time of site exploration. Soils were classified in accordance with the Unified Soil Classification System described in Appendix A. Boring logs were prepared and are presented in Appendix A.

Laboratory Testing:

Samples retrieved during the field exploration were transported to our laboratory for further evaluation. At that time, the field descriptions were confirmed or modified as necessary. Due to the shallow rock encountered and the poor sample recoveries, laboratory testing of the rock was deemed unnecessary.

SITE CONDITIONS

The site of the reservoir is located approximately 1,100 feet east of the intersection of US-550 and NM-173. The boring and test pit locations were on the north side of the reservoir, outside of the fence and off the embankment. The reservoir has residential buildings to the north and east, a commercial building to the west, a reservoir to the south, and NM-173 to the southwest. At the location of the boring and test pit was approximately 6½ feet below the top of the embankment. The area was relatively level, with the exception of a small pond area to the east. The area was vegetated with medium to large bushes and small grass at the time of our exploration. The following photographs depict the site at the time of our exploration.



**Drill Rig near Boring B-1
View Towards the East**



Existing Reservoir and Tower (within reservoir)
View Towards the East



Test Pit Excavation (w/ spoils pile)
View Towards the North

SUBSURFACE CONDITIONS

Soil Conditions:

As presented on the Boring and Test Pit Logs in Appendix A, in boring B-1 we encountered sandy soils that extended to approximately 2½ feet bgs and were underlain by gravel and cobbles that extended the remaining depth of exploration of 4 feet bgs. The boring was terminated short of the planned depth of 45 feet due to auger refusal on gravel and cobbles. In the test pit TP-1 we encountered sandy soils that extended to approximately 3½ feet bgs and were underlain by gravels and cobbles that extended to approximately 16 feet bgs and were underlain by sandy soils that extended the remaining depth of exploration of 19 feet bgs. The sandy soils encountered at 19 feet were moist and had higher moisture contents than the overlying soils. Although it could not be confirmed, the increase moisture could be due to moisture infiltration from the adjacent reservoir. The test pit was terminated at this depth due to the sides collapsing into the hole.

The sandy soils encountered above the gravel and cobbles were generally fine- to coarse-grained and ranged in color from tan to brown with a moisture of damp. The sandy soils encountered below the gravel and cobbles were generally fine- to medium-grained and ranged in color from tan to gray to brown with a moisture of damp to moist.

In the previous GEOMAT Report, 191-3229 (dated February 22, 2019), existing soils were underlain by gravel and cobbles which were generally encountered within 30 inches below the existing grade at that time. See Appendix C for more information.

Groundwater Conditions:

Groundwater was not encountered in the borings or test pits to the depths explored. Groundwater elevations can fluctuate over time depending upon precipitation, irrigation, runoff and infiltration of surface water. We do not have any information regarding the historical fluctuation of the groundwater level in this vicinity.

OPINIONS AND RECOMMENDATIONS

Geotechnical Considerations:

The site is considered suitable for the proposed tower based on the geotechnical conditions encountered and tested for this report. To reduce the potential for settlement and provide more uniform and higher allowable bearing pressures, the tower foundation should bear on native gravel and cobbles.

As previously noted, our exploration was conducted outside of the existing reservoir and, as such, the recommendations herein are preliminary. Additional investigation prior to or during construction will be necessary to confirm and/or modify our recommendations as appropriate.

If there are any significant deviations from the assumed floor elevations, structure location and/or loads noted at the beginning of this report, the opinions and recommendations of this report should be reviewed and confirmed/modified as necessary to reflect the final planned design conditions.

Foundations:

Tower Foundation:

Based on our understanding of the type of structure to be built and the results of our field subsurface exploration and laboratory testing, the reservoir tower could be founded on a structural slab/mat foundation bearing on native gravel and cobbles. The bearing material will likely be determined by the depth below grade required for the tower foundation and the amount of cut/fill required to achieve the finished grade.

A maximum allowable bearing value of 2,000 psf may be used for the structurally reinforced slab foundation system bearing on native gravel and cobbles. If present, any existing pond sediment should be completely removed from beneath the foundation down to the gravels and cobbles. Consideration could be given to the placement of leveling course such as compacted base course between the bottom of the footing and the underlying compacted gravel and cobbles.

A coefficient of subgrade reaction (K_{V1}) of 250 kips per cubic foot (kcf) is appropriate for the subgrade. This coefficient can be corrected to account for the width (b) of slab using the following equation:

$$K = K_{V1} ((b+1)/(2b))^2$$

If soils are expected to be in the saturated conditions, buoyant forces should be considered in the design. GEOMAT should be contacted for further recommendations should uplift resistance

Materials and compaction criteria should be as recommended in the **Earthwork** section of this report. Because of the rocky nature of the native gravels and cobbles, it is unlikely that compaction testing by typical methods will be possible. As such, it is recommended that proof-compaction of the native soils be observed and documented by a representative of the geotechnical engineer.

Retaining Wall Foundations:

Based on our understanding of the type of structures to be built and the results of our field subsurface exploration and laboratory testing, the retaining walls for the concrete access drive could be founded on conventional shallow spread footings bearing on engineered fill. If present, any existing pond sediment should be completely removed from beneath the retaining walls and replaced with engineered fill. The engineered fill should be provided for a distance below the footings equal to the footing width, that required to completely remove the pond sediment, or two (2.0) feet minimum, whichever is greater. The engineered fill should extend laterally beyond the edges of the footings for a minimum distance of one (1.0) foot. See the **Earthwork** section of this report for additional information regarding engineered fill and compaction.

The recommended design bearing capacities and footing depths are presented in the following table.

Footing Depth¹ (ft)	Allowable Bearing Pressure (psf)	Bearing Soil
2.5²	2,000	Engineered Fill

¹Footing depth referenced below lowest adjacent finished grade or lowest scour depth, whichever is deeper. Finished grade is the lowest adjacent grade.

²Minimum footing depth for frost protection.

Differential Settlement:

Total and differential settlements resulting from the assumed structural loads are estimated to be on the order of 3/4 inch or less for the tower and 1/2 inch for the retaining walls. Proper drainage should be provided in the final design and during construction and areas adjacent to the structure should be designed to prevent water from ponding or accumulating next to the structure.

Total and differential settlements should not exceed predicted values, provided that:

- Foundations are constructed as recommended, and
- Essentially no changes occur in water contents of foundation soils.

For foundations adjacent to descending slopes, a minimum horizontal setback of five (5) feet should be maintained between the foundation base and slope face. In addition, the setback should be such that an imaginary line extending downward at 45 degrees from the nearest foundation edge does not intersect the slope.

Footings and foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement.

Foundation excavations should be observed by GEOMAT. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

Site Classification:

Based on the subsurface conditions encountered in the borings, we estimate that Site Class D is appropriate for the site according to the International Building Code. This parameter was estimated based on extrapolation of data beyond the deepest depth explored, using methods allowed by the code. Actual shear wave velocity testing/analysis and/or exploration to a depth of 100 feet were not performed as part of our scope of services for this project.

Lateral Earth Pressures:

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are presented in the following table:

- **Active:**
 - Granular soil backfill 35 psf/ft
 - Undisturbed subsoil 30 psf/ft

- **Passive:**
 - Shallow foundation walls 250 psf/ft
 - Shallow column footings..... 350 psf/ft

- **Coefficient of base friction:** 0.40 *
 - * The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

- **At rest:**
 - Granular soil backfill50 psf/ft
 - Undisturbed subsoil60 psf/ft

For soils in submerged conditions, recommended equivalent fluid pressures for unrestrained foundation elements are presented in the following table:

- **Active:**
 - Granular soil backfill 15 psf/ft
 - Undisturbed subsoil 15 psf/ft

- **Passive:**
 - Shallow foundation walls 250 psf/ft
 - Shallow column footings..... 350 psf/ft

- **Coefficient of base friction:** 0.20 *
 - * The coefficient of base friction should be reduced to 0.15 when used in conjunction with passive pressure.

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

- **At rest:**
 - Granular soil backfill15 psf/ft
 - Undisturbed subsoil.....35 psf/ft

Fill against grade beams and retaining walls should be compacted to densities specified in **Earthwork**. Medium to high plasticity clay soils should not be used as backfill against retaining walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Over compaction may cause excessive lateral earth pressures that could result in wall movement.

Slopes:

Assuming fill specifications, compaction requirements, and recommended setbacks provided in this report are followed, cut and fill slopes as steep as to 2.5:1 (horizontal:vertical) should be stable. Depending upon specific project conditions, adequate factors of safety against slope failure may be available for steeper configurations. However, such a determination would require additional analysis.

Earthwork:

General Considerations:

The opinions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Although underground facilities such as foundations, septic tanks, cesspools, basements and irrigation systems were not encountered during site reconnaissance, such features could exist and might be encountered during construction.

Site Clearing:

1. As necessary, strip and remove all existing pavement, fill, debris and other deleterious materials from the proposed tower foundation area. Any existing structures should be completely removed from below any foundation, including foundation elements and any associated development such as underground utilities, septic tanks, etc.
2. If unexpected fills or underground facilities are encountered during site clearing, we should be contacted for further recommendations. All excavations should be observed by GEOMAT prior to concrete and/or backfill placement.
3. Stripped materials consisting of vegetation and organic materials should be removed from the site, or used to re-vegetate exposed slopes after completion of grading operations.
4. Sloping areas steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment.
5. All exposed soil areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of eight inches, conditioned to near optimum moisture content, and compacted to at least 95% of modified proctor (ASTM D1557). Exposed bedrock areas will only require cleaning, prior to receiving fill. Native gravels and cobbles should be proof-rolled under observation by GEOMAT.

Excavation:

We present the following general comments regarding our opinion of the excavation conditions for the designers' information with the understanding that they are opinions based on our boring data. More accurate information regarding the excavation conditions should be evaluated by contractors or other interested parties from test excavations using the equipment that will be used

during construction. Based on the conditions encountered in the test boring and test pit, it is our opinion that in place soil can be excavated using standard excavation equipment.

Foundation Preparation:

The shallow structural/mat foundation should bear on native gravels and cobbles as recommended in the **Foundations** section of this report. All loose and/or disturbed soils should either be compacted or removed from the bottom of the mat foundation excavations prior to placement of reinforcing steel and/or concrete.

Fill Materials:

1. If required, native or imported soils with low expansive potentials could be used as fill material for the following:
 - general site grading
 - foundation areas
 - foundation backfill
2. Select granular materials should be used as backfill behind walls that retain earth.
3. On site or imported soils to be used in structural fills should conform to the following:

<u>Gradation</u>	<u>Percent Finer by Weight</u> <u>(ASTM C136)</u>
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	50 Max

Maximum expansive potential (%) * 1.5

* Measured on a sample compacted to approximately 95 percent of the ASTM D1557 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 144-psf surcharge and submerged.

Placement and Compaction:

1. If required, place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.
2. Un-compacted fill lifts should not exceed 10 inches loose thickness.

3. Materials should be compacted to the following:

<u>Material</u>	<u>Minimum Percent (ASTM D1557)</u>
Subgrade soils beneath fill areas	95
On site or imported soil fills:	
Beneath footings, slabs on grade and pavements.....	95
Aggregate base beneath slabs and pavements	95
Miscellaneous backfill.....	90

4. On-site and imported soils should be compacted at moisture contents near optimum.

Compliance:

Recommendations for slabs-on-grade and foundation elements supported on compacted fills depend upon compliance with **Earthwork** recommendations. To assess compliance, observation and testing should be performed by GEOMAT.

GENERAL COMMENTS

It is recommended that GEOMAT be retained to provide a general review of final design plans and specifications to confirm that grading and foundation recommendations in this report have been interpreted and implemented. If any changes of the proposed project are planned, the opinions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

GEOMAT should also be retained to provide services during excavation, grading, foundation, and construction phases of the work. Observation of foundation excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present and is considered a necessary part of continuing geotechnical engineering services for the project. Construction testing, including field and laboratory evaluation of fill, backfill, pavement materials, concrete and steel should be performed to determine whether applicable project requirements have been met.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the location of test boring may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar

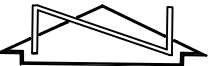

localities at the same time. No warranty, express or implied, is intended or made. We prepared the report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction equipment and techniques to be used on this project.

This report is for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. This report has also not addressed any geologic hazards that may exist on or near the site.

This report may be used only by the Client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on and off site), or other factors may change over time and additional work may be required with the passage of time. Any party, other than the Client, who wishes to use this report, shall notify GEOMAT in writing of such intended use. Based on the intended use of the report, GEOMAT may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements, by the Client or anyone else, will release GEOMAT from any liability resulting from the use of this report by an unauthorized party.

Appendix A



 Approximate Not to Scale	SITE PLAN		PROJECT	
	Boring Locations (approximate)		Aztec Reservoir No. 1 New Tower Aztec, New Mexico	
	GEOMAT Project No. 222-3931 Date of Exploration: Feb 18 & March 1, 2022			
				



915 Malta Ave
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Boring B-1

Page 1 of 1

Project Name: <u>Aztec Reservoir #1 New Tower</u>	Date Drilled: <u>2/18/2022</u>
Project Number: <u>222-3931</u>	Latitude: <u>Not Determined</u>
Client: <u>Bohannon Huston, Inc.</u>	Longitude: <u>Not Determined</u>
Site Location: <u>Aztec, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk and Split spoon samples</u>	Logged By: <u>DH</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results					Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)								
				14-24-21	GRAB		SM		1	Silty SAND, tan/brown, fine- to coarse-grained, damp	
					SS		RK		2		
									3	GRAVEL and COBBLE with silty sand, tan/brown, fine- to coarse-grained, very dense, slightly damp to damp	
									4		
									5	Auger Refusal on gravel and cobbles Total Depth 4 feet	
									6		
									7		
									8		
									9		
									10		
									11		
									12		
									13		
									14		
									15		
									16		
									17		
									18		
									19		
									20		

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer



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Test Pit TP-1

Page 1 of 1

Project Name: <u>Aztec Reservoir #1 New Tower</u>	Date Excavated: <u>3/1/2022</u>
Project Number: <u>222-3931</u>	Latitude: <u>Not Determined</u>
Client: <u>Bohannon Huston, Inc.</u>	Longitude: <u>Not Determined</u>
Site Location: <u>Aztec, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Hyundai 210 LC-7 Excavator</u>	Test Pit Location: <u>See Site Plan</u>
Excavation Method: <u>32" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk samples from excavator</u>	Logged By: <u>DH</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							SM		1	Silty SAND, tan/brown, fine- to coarse-grained, damp
									2	
									3	
							RK		4	GRAVEL and COBBLES with silty sand, brown, fine- to coarse-grained, slightly damp to damp
									5	
									6	
									7	
									8	
									9	
									10	tan/brown increase in size and frequency of boulders
									11	
									12	
									13	
									14	
									15	
							SM		16	Silty SAND, tan/gray, fine- to medium-grained, damp to moist brown/gray
									17	
	44	NP				GRAB			18	brown
									19	Total Depth 19 feet
									20	

TEST PIT 222-3931.GPJ 3/7/22

GRAB = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon ND = Nuclear Densometer D = Disturbed Bulk Sample

UNIFIED SOIL CLASSIFICATION SYSTEM					CONSISTENCY OR RELATIVE DENSITY CRITERIA			
Major Divisions			Group Symbols	Typical Names				
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	<u>Standard Penetration Test</u> Density of Granular Soils			
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines				
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures	0-4	Very Loose	Penetration Resistance, N (blows/ft.)	Relative Density
			GC	Clayey gravels, gravel-sand-clay mixtures				
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	5-10	Loose		
			SP	Poorly graded sands and gravelly sands, little or no fines	11-30	Medium Dense		
		Sands with Fines	SM	Silty sands, sand-silt mixtures	31-50	Dense		
			SC	Clayey sands, sand-clay mixtures	>50	Very Dense		
	Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid Limit 50 or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	<u>Standard Penetration Test</u> Density of Fine-Grained Soils			
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
OL			Organic silts and organic silty clays of low plasticity	<2	Very Soft	<0.25		
Silts and Clays Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts	2-4	Soft	0.25-0.50		
		CH	Inorganic clays of high plasticity, fat clays	4-8	Firm	0.50-1.00		
		OH	Organic clays of medium to high plasticity	8-15	Stiff	1.00-2.00		
		PT	Peat, mucic & other highly organic soils	15-30	Very Stiff	2.00-4.00		
Highly Organic Soils		PT	Peat, mucic & other highly organic soils	>30	Hard	>4.0		
U.S. Standard Sieve Sizes								
>12"	12"	3"	3/4"	#4	#10	#40	#200	
Boulders	Cobbles	Gravel		Sand			Silt or Clay	
		coarse	fine	coarse	medium	fine		

MOISTURE CONDITIONS

Dry	Absence of moist, dusty, dry to the touch
Slightly Damp	Below optimum moisture content for compaction
Moist	Near optimum moisture content, will moisten the hand
Very Moist	Above optimum moisture content
Wet	Visible free water, below water table

MATERIAL QUANTITY

trace	0-5%
few	5-10%
little	10-25%
some	25-45%
mostly	50-100%

OTHER SYMBOLS

R	Ring Sample
S	SPT Sample
B	Bulk Sample
▼	Ground Water

BASIC LOG FORMAT:

Group name, Group symbol, (grain size), color, moisture, consistency or relative density. Additional comments: odor, presence of roots, mica, gypsum, coarse particles, etc.

EXAMPLE:

SILTY SAND w/trace silt (SM-SP), Brown, loose to med. Dense, fine to medium grained, damp

UNIFIED SOIL CLASSIFICATION SYSTEM

TEST DRILLING EQUIPMENT & PROCEDURES

Description of Subsurface Exploration Methods


Drilling Equipment – Truck-mounted drill rigs powered with gasoline or diesel engines are used in advancing test borings. Drilling through soil or softer rock is performed with hollow-stem auger or continuous flight auger. Carbide insert teeth are normally used on bits to penetrate soft rock or very strongly cemented soils which require blasting or very heavy equipment for excavation. Where refusal is experienced in auger drilling, the holes are sometimes advanced with tricone gear bits and NX rods using water or air as a drilling fluid.

Coring Equipment – Portable electric core drills are used when recovery of asphalt or concrete cores is necessary. The core drill is equipped with either a 4” or 6” diameter diamond core barrel. Water is generally used as a drilling fluid to facilitate cooling and removal of cuttings from the annulus.

Sampling Procedures - Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In most cases, 2” outside diameter, 1 3/8” inside diameter, samplers are used to obtain the standard penetration resistance. “Undisturbed” samples of firmer soils are often obtained with 3” outside diameter samplers lined with 2.42” inside diameter brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samplers in 6-inch increments. These values are expressed in blows per foot on the boring logs. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. “Undisturbed” sampling of softer soils is sometimes performed with thin-walled Shelby tubes (ASTM D1587). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Where samples of rock are required, they are obtained by NX diamond core drilling (ASTM D2113).

Boring Records - Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the logs.

Appendix B

LAB NO.	BORING NO.	SAMPLE DEPTH (ft)	ASTM D698		MOISTURE CONT. (%)	DENSITY		ATTERBERG LIMITS			SWELL (%)	CONSOL TEST	% PASS #200 SIEVE	CLASSIFICATION
			Density	Moisture		WET (pcf)	DRY (pcf)	LL	PL	PI				
7558	TP-1	18.0	-	-	-	-	-	NLL	NPL	NP	-	-	44	Silty SAND (SM)
						SUMMARY OF SOIL TESTS						Project		Aztec Reservoir No. 1 New Tower
												Job No.		222-3931
												Location		Aztec, New Mexico
												Date of Exploration		Feb 18 & March 1, 2022

LABORATORY TESTING PROCEDURES

Laboratory testing is performed by trained personnel in our accredited laboratory or may be subcontracted by GEOMAT through a qualified outside laboratory if necessary. Actual types and quantities of tests performed for any project will be dependent upon subsurface conditions encountered and specific design requirements.

The following is an abbreviated table of laboratory testing that may be performed by GEOMAT with the applicable standards listed. Testing for a specific project may include all or a selected subset of the laboratory work listed. Laboratory testing beyond those listed may be available and could be incorporated into the project scope at the discretion of GEOMAT.

PROCEDURE	ASTM	AASHTO
Moisture Content	ASTM D2216	AASHTO T 265
Sieve Analysis	ASTM C136	AASHTO T 27
Fines Content	ASTM D1140	T 11
Hydrometer	ASTM D422	T 88
Atterberg Limits	ASTM D4318	AASHTO T 89/T 90
Soil Compression/Expansion	ASTM D2435	T 216
Soil Classification	ASTM D2487	M 145
Direct Shear	ASTM D3080	T 236
Unconfined Compressive Strength of Soils	ASTM D2166	T 208
Unconfined Compressive Strength of Rock Cores	ASTM D4543	-

Appendix C

February 22, 2019

Todd Burt, P.E.

Bohannan Huston, Inc.
7500 Jefferson Street NE
Albuquerque, New Mexico 87109

RE: Reservoir No. 1 Clay Liner and Subgrade Exploration
City of Aztec, New Mexico
GEOMAT Project No. 191-3229

As requested, on February 18, 2019 GEOMAT performed fifteen soil borings in the bottom of the City of Aztec's Raw Water Reservoir No. 1 Sediment Pond. The soil borings were advanced by hand methods to depths between approximately 6 inches to 30 inches where auger refusal was encountered on gravels and cobbles. Standing water was present at the west side of the pond around the intake tower and in the central portion of the pond. We understand it was anticipated there would be an approximately 6 inch thick clay liner layer in the pond. No distinct, uniform clay liner layer was observed in our borings. The moisture condition of the soils in each of the borings was moist except for B-4, B-7, B-13, and B-14, where free water was encountered in the four borings. Table 1 presents the boring depths and visual descriptions of the soil conditions encountered in each of the fifteen borings.

Table 1 – Soil boring approximate locations, depths, visual soil descriptions, and unified soil classifications.

Boring No.	Approximate Latitude	Approximate Longitude	Depth Explored (in.)*	Visual Method Description of Soils, ASTM D2488	Classification for Engineering Purposes, ASTM D2487
B-1	36.834661	-107.975554	0 to 18	Lean to Fat Clay with Sand	--
			18 to 30	Clayey Sand with Gravel	SC – Clayey Sand with Gravel
B-2	36.834841	-107.975418	0 to 18	Sandy Lean to Fat Clay	--
			18 to 24	Clayey Sand	--
B-3	36.835066	-107.975460	0 to 18	Sandy Lean to Fat Clay with Gravel	--
B-4	36.835284	-107.975497	0 to 14	Clayey Sand with Gravel	SC-SM – Silty, Clayey Sand with Gravel
B-5	36.835510	-107.975527	0 to 10	Clayey Sand with Gravel	--
			10 to 16	Lean to Fat Clay with Sand	--
B-6	36.835405	-107.975796	0 to 6	Clayey Sand with Gravel	--
			6 to 10	Sandy Lean to Fat Clay with Gravel	SC – Clayey Sand with Gravel
B-7	36.835449	-107.976088	0 to 6	Clayey Sand with Gravel	--
B-8	36.835341	-107.976353	0 to 18	Clayey Sand with Gravel	--
B-9	36.835381	-107.976609	0 to 18	Clayey Sand with Gravel	--
B-10	36.835126	-107.976308	0 to 20	Clayey Sand	--
B-11	36.835091	-107.976059	0 to 8	Clayey Sand	--
B-12	36.834887	-107.976035	0 to 12	Clayey Sand	--
B-13	36.835133	-107.975649	0 to 10	Lean to Fat Clay with Sand	--
B-14	36.834920	-107.975631	0 to 12	Clayey Sand with Gravel	--
			12 to 18	Lean to Fat Clay with Sand	CL – Lean Clay with Sand
B-15	36.834768	-107.975790	0 to 12	Sandy Lean to Fat Clay with Gravel	--

*Auger refusal was encountered on gravels and cobbles at the total depth explored in each of the borings.

Todd Burt, P.E.
Bohannon Huston, Inc.
Reservoir No. 1 Clay Liner and Subgrade Exploration
February 22, 2019



Soil samples were collected from select boring locations and depths. Particle size analysis and Atterberg limits tests were performed on four of these samples in order to classify them per ASTM D2487. The unified soil classifications of these four samples are presented in Table 1. The test results for these four samples are included in the attached Laboratory Reports.

Thank you for the opportunity to be of service to you on this project. If you have any questions or need additional information, please let us know.

Sincerely yours,
GEOMAT, Inc.

A handwritten signature in blue ink that reads "Nathaniel J. Compton".

Nathaniel J. Compton, P.E.
Construction Services Manager

Attachments: Laboratory Report (4)

Distribution: Addressee (1), Tandy Freel, P.E. (1)

LABORATORY REPORT

Client: Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, NM 87109

Report Date: February 22, 2019
GEOMAT Project No: 191-3229
Page No: 1 of 1
Lab No: 7760

Attn: Todd Burt, P.E.

Project: City of Aztec Reservoir No. 1 Clay Liner and Subgrade Exploration

Sampled By: J. Kelly & D. Holiday/GEOMAT
Sampled Date: February 18, 2019
Requested By: T. Burt/BHI

Location: Aztec, New Mexico

Sample Location: Boring B-1 at 18" to 30" Depth

Source: Boring Cuttings

Material Description (Color, Symbol, Group): ASTM Classification: SC – Clayey Sand with Gravel

Sieve Analysis, ASTM C117, C136		
Sieve Size	% Passing	Specifications
6"		
5"		
4"		
3"		
2 ½"		
2"	100	
1 ½"	74	
1"	74	
¾"	72	
½"	69	
3/8"	68	
No. 4	64	
No. 8	62	
No. 10	61	
No. 16	58	
No. 30	48	
No. 40	43	
No. 50	38	
No. 100	32	
No. 200	26	

Plasticity Index, ASTM D4318		
	Results	Specifications
Liquid Limit (LL)	29	
Plastic Limit (PL)	17	
Plasticity Index (PI)	12	



Reviewed By:

Distribution: BHI – Todd Burt, P.E. (1), Tandy Freel, P.E. (1)

Note: This is a summarized report of the referenced procedures and does not include all reporting requirements. Additional data can be provided at client's request.

LABORATORY REPORT

Client: Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, NM 87109

Report Date: February 22, 2019
GEOMAT Project No: 191-3229
Page No: 1 of 1
Lab No: 7761

Attn: Todd Burt, P.E.

Project: City of Aztec Reservoir No. 1 Clay Liner and Subgrade Exploration

Sampled By: J. Kelly & D. Holiday/GEOMAT
Sampled Date: February 18, 2019
Requested By: T. Burt/BHI

Location: Aztec, New Mexico

Sample Location: Boring B-4 at 0" to 14" Depth

Source: Boring Cuttings

Material Description (Color, Symbol, Group): ASTM Classification: SC-SM – Silty, Clayey Sand with Gravel

Sieve Analysis, ASTM C117, C136		
Sieve Size	% Passing	Specifications
6"		
5"		
4"		
3"		
2 ½"		
2"	100	
1 ½"	85	
1"	82	
¾"	81	
½"	79	
3/8"	78	
No. 4	74	
No. 8	72	
No. 10	71	
No. 16	66	
No. 30	48	
No. 40	38	
No. 50	30	
No. 100	23	
No. 200	19	

Plasticity Index, ASTM D4318		
	Results	Specifications
Liquid Limit (LL)	24	
Plastic Limit (PL)	18	
Plasticity Index (PI)	6	

Reviewed By:



Distribution: BHI – Todd Burt, P.E. (1), Tandy Freel, P.E. (1)

Note: This is a summarized report of the referenced procedures and does not include all reporting requirements. Additional data can be provided at client's request.

LABORATORY REPORT

Client: Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, NM 87109

Report Date: February 22, 2019
GEOMAT Project No: 191-3229
Page No: 1 of 1
Lab No: 7762

Attn: Todd Burt, P.E.

Project: City of Aztec Reservoir No. 1 Clay Liner and Subgrade Exploration

Sampled By: J. Kelly & D. Holiday/GEOMAT
Sampled Date: February 18, 2019
Requested By: T. Burt/BHI

Location: Aztec, New Mexico

Sample Location: Boring B-6 at 6" to 10" Depth

Source: Boring Cuttings

Material Description (Color, Symbol, Group): ASTM Classification: SC – Clayey Sand with Gravel

Sieve Analysis, ASTM C117, C136		
Sieve Size	% Passing	Specifications
6"		
5"		
4"		
3"		
2 1/2"		
2"	100	
1 1/2"	88	
1"	85	
3/4"	85	
1/2"	85	
3/8"	84	
No. 4	83	
No. 8	83	
No. 10	82	
No. 16	81	
No. 30	80	
No. 40	56	
No. 50	48	
No. 100	40	
No. 200	33	

Plasticity Index, ASTM D4318		
	Results	Specifications
Liquid Limit (LL)	33	
Plastic Limit (PL)	19	
Plasticity Index (PI)	14	



Reviewed By:

Distribution: BHI – Todd Burt, P.E. (1), Tandy Freel, P.E. (1)

Note: This is a summarized report of the referenced procedures and does not include all reporting requirements. Additional data can be provided at client's request.

LABORATORY REPORT

Client: Bohannon Huston, Inc.
7500 Jefferson Street NE
Albuquerque, NM 87109

Report Date: February 22, 2019
GEOMAT Project No: 191-3229
Page No: 1 of 1
Lab No: 7763

Attn: Todd Burt, P.E.

Project: City of Aztec Reservoir No. 1 Clay Liner and Subgrade Exploration

Sampled By: J. Kelly & D. Holiday/GEOMAT
Sampled Date: February 18, 2019
Requested By: T. Burt/BHI

Location: Aztec, New Mexico

Sample Location: Boring B-14 at 12" to 18" Depth

Source: Borings Cuttings

Material Description (Color, Symbol, Group): ASTM Classification: CL – Lean Clay with Sand

Sieve Analysis, ASTM C117, C136		
Sieve Size	% Passing	Specifications
6"		
5"		
4"		
3"		
2 1/2"		
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"	100	
No. 4	99	
No. 8	99	
No. 10	99	
No. 16	98	
No. 30	95	
No. 40	93	
No. 50	92	
No. 100	88	
No. 200	82	

Plasticity Index, ASTM D4318		
	Results	Specifications
Liquid Limit (LL)	47	
Plastic Limit (PL)	25	
Plasticity Index (PI)	22	



Reviewed By:

Distribution: BHI – Todd Burt, P.E. (1), Tandy Freel, P.E. (1)

Note: This is a summarized report of the referenced procedures and does not include all reporting requirements. Additional data can be provided at client's request.

Appendix D

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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