



Project Manual
Including Specifications for
The Construction of

**TOWN OF MESILLA
MESILLA, NM
MESILLA WATER SYSTEM BOOSTER PUMP
REPLACEMENT**

**Control Number:
SAP 20-E2124-STB**

November 2022

OWNER:

Town of Mesilla
P.O. Box 10
Mesilla, New Mexico 88046

ENGINEER:

John Montoya, P.E.
MOLZEN CORBIN
1155 Commerce Drive, Suite F
Las Cruces, New Mexico 88011

ENGINEER OF RECORD

Molzen Corbin
1155 Commerce Drive, Suite F
Las Cruces, NM 88011
(575) 522-0049

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.



07-08-22

N.M.P.E. No. 12423

All questions about the meaning or intent of these documents shall be submitted only to the Engineer of Record, stated above, in writing.

OWNER'S ACKNOWLEDGEMENT

Town of Mesilla
P.O. Box 10
2231 Avenida de Mesilla
Mesilla, NM 88046
(575) 522-0049

As the owner I acknowledge that I have reviewed and understand the plans and specifications for this project. I have been involved in the design and in the design decision process throughout the design development phase.



7/14/2022

Rod McGillivray, Public Works Director

Date

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ADVERTISEMENT FOR BIDS

ADVERTISEMENT FOR BIDS
Town of Mesilla
Town of Mesilla, New Mexico
Mesilla Water SYS Booster Pump RPLC

General Notice

Town of Mesilla is requesting Bids for the construction of the following Project:

Mesilla Water SYS Booster Pump RPLC
SAP 20-E2124-STB

Bids for the construction of the Project will be received at the **Town of Mesilla, Town Hall** located at **office of the Town Clerk located at, 2231 Avenida De Mesilla, Mesilla, New Mexico 88046**, until Tuesday **December 13, 2022 at 2:00 p.m.** local time. At that time the Bids received will be **publicly** opened and read.

The Project includes the following Work:

1. Boosters station to replace and existing station. The work includes:
 - a. Tie into existing 12" water line that will supply the boosters station.
 - b. Install a 4" water line from the 12" lint to the booster station .
 - c. Install booster station pumps, piping, valves pressure tank, gas powered electric generator and propane tank.
 - d. Construct associated electrical systems and instrumentation systems
 - e. Construct 4" line out of booster station to connect to existing water system
 - f. Demolish existing booster station

Bids are requested for the following Contract: **Mesilla Water SYS Booster Pump RPLC**

Obtaining Method for Bidding Documents

Information and Bidding Documents can be requested by email to Leah Pena at Molzen Corbin, email address is lpena@molzencorbin.com.

Prospective Bidders are urged to provide additional contact information when emailing for bidding documents. Please include a contact name, phone number and preferred methods for receiving project information. Registration with the Leah Pena as a plan holder is encouraged even if Bidding Documents are obtained from a plan room or source other than described above. This information will used to send updates 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 this method. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated method described herein.

The Issuing Office for the Bidding Documents is:

Molzen Corbin 1155 Commerce Drive, Suite F
Las Cruces, New Mexico 88011

Prospective Bidders may examine the Bidding Documents at the Issuing Office on Monday through Friday between the hours of **8-5 and** may obtain copies of the Bidding Documents from the Issuing Office as described below. Partial sets of Bidding Documents will not be available from the Issuing

Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including addenda, if any, obtained from sources other than the Issuing Office.

Printed copies of the Bidding Documents may be obtained from the Issuing Office by paying a deposit of **\$100** for each set. Bidders who return full sets of the Bidding Documents in good condition within 10 days after receipt of Bids will receive a full refund. Non-Bidders, and Bidders who obtain more than one set of the Bidding Documents, will receive a refund of **\$100** for documents returned in good condition within the time limit indicated above. Make deposit checks for Bidding Documents payable to **The Town of Mesilla**.

Bidding Documents may be purchased from the Issuing Office during the hours indicated above. Cost does not include shipping charges. Upon Issuing Office's receipt of payment, printed Bidding Documents or electronic documents on compact disk will be sent via the prospective Bidder's delivery service. The shipping charge amount will depend on the shipping method chosen. Bidding Documents are available for purchase in the following formats:

Pre-bid Conference

A pre-bid conference for the Project will be held on **Tuesday November 29, 2022, at 2:00pm at Town of Mesilla, Town Hall** located at, **2231 Avenida De Mesilla, Mesilla, New Mexico 88046**. Be prepared to visit the project site. Attendance at the pre-bid conference is encouraged but not required.

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: **Town of Mesilla**

By: **Rod McGillivray**

Title: **Public Works Director**

Date: **November 13, 2022**

INSTRUCTIONS TO BIDDERS

ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.
 - B. *Offeror*— An Individual or entity submitting a Proposal for this Project. The term Bidder and Offeror are considered to have the same meaning and may be used interchangeably.
 - C. *Proposal*—The set of documents identified herein as required to be submitted in order to be responsive to this procurement solicitation. The term Bid and Proposal shall be considered to have the same meaning and may be used interchangeably.

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 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office. The deposit will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 10 days after opening of Bids.
- 2.07 *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 PDF (Portable Document Format) (.pdf) format. 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 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
 - A. Written evidence that Bidder is licensed to do business in the state where the Project is located.
 - B. Bidder's state or other contractor license number, if applicable.
 - C. Subcontractor and Supplier qualification information.
 - D. In order for a Bid to be acceptable, the General Contractor and any Subcontractor whose work is in excess of \$60,000 must be registered with the New Mexico Department of Workforce Solutions, Labor Enforcement at the time of Bidding.
- 3.02 A Bidder's failure to submit required qualification information will result in the submitted Bid being deemed non-responsive.
- 3.03 The minimum required qualifications to perform the Work are as follows:
 - A. The Contractor shall have completed at least two projects of similar scope and magnitude in the last ten years.
 - B. Contractor's Project Manager shall have served as Project Manager on at least three completed projects of similar scope and magnitude in the last ten years.
 - C. Contractor's Superintendent shall have served as Superintendent on at least three completed projects of similar scope and magnitude in the last ten years.
 - D. These qualifications are for the purpose of determining whether or not the Contractor meets the minimum threshold of capabilities and experience required by the Owner to complete the Work. No qualitative assessment of the Contractor's qualifications will be made except that the Engineer will determine whether or not the minimum qualification criteria is demonstrated by the Contractor's submitted data.
- 3.04 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.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
4. *Geotechnical Data Report*: The Bidding Documents contain a Geotechnical Data Report (GDR).
 - a. As set forth in the Supplementary Conditions, the GDR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during

construction in specified locations (“Baseline Conditions”). The GDR is a Contract Document.

- b. The Baseline Conditions in the GDR 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 GDR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.
 - c. Nothing in the GDR 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.
- 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. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

- 1. BLM PERMIT
- 2. DAC utility permit

Owner will make copies of these other Site-related documents available to any Bidder on request.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site, and abide by all security protocol required by Owner.
- B. A Site visit is scheduled following the pre-bid conference. Maps to the Site are part of the plan set.
- C. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Rod McGillivray, (575) 524-3262**. Bidder must conduct the required Site visit during normal working hours.
- D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- E. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional

examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

- F. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- G. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program.

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

John Montoya, Engineer, (575)522-0049, email: jmontoya@molzencorbin.com

Amanda Lara, Designer, (575)522-0049, email: alara@molzencorbin.com

- 7.02 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.
- 7.03 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.
- 7.04 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or 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, and (c) Milestones (if any) are to be achieved, 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 A Bidder must be prepared to retain specific Subcontractors and Suppliers listed by Bidder for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 11.02 Requirements of the Subcontractors Fair Practice Act shall govern the threshold requirements for Subcontractor listing.
- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute without an increase in the Bid.
- 11.04 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 not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer or Plan Holders.
- 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.
- 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 and no alterations have been made.

- 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. The Corporate Seal must be affixed and attested by the Corporate Secretary or the Assistant Secretary.
- 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 or type written 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 *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.

13.02 *Allowances*

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

ARTICLE 14—SUBMITTAL OF BID

14.01 All Bidders who are submitting a Bid on this Project are required to submit the following documents:

- Bid
- Bid Security Bond
- List of Subcontractors for compliance with New Mexico Subcontractor's Fair Practices Act
- Resident Contractor Certificate issued by the Taxation and Revenue Department (if seeking preference)
- Resident Veteran Contractor Certificate issued by the Taxation and Revenue Department (if seeking preference)
- Bidder's Qualifications Statement

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.

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

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 A Bid Proposal may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid Proposal must be executed) and delivered to the place where Bid Proposals are to be submitted at any time prior to the scheduled closing time for the receipt of bids. Bids shall be unconditionally accepted for consideration of award without alteration or correction except as authorized by the **Owner**.

The Owner may allow a correction or withdrawal of a bid because of an inadvertent, non-judgmental mistake in the bid, within the limitations below.

- A. **Confirmation of Bid.** The **Owner** may require the apparent low Bidder to confirm its bid when obvious errors regarding the amount of the bid are apparent on the face of the bid or the bid amount is unreasonably lower than other bids submitted.

B. Correction of Bid. The Owner may allow a Bidder to correct mistakes discovered by either Owner or Bidder after Bid Opening and prior to award of the Contract without forfeiture of bid security in the following circumstances:

- when technical irregularities exist that have no effect on the price, quantity, quality, delivery or contractual conditions.
- when mistakes exist and the intended correct bid is clearly evident on the face of the bid.

15.02 The Owner may allow a Bidder to correct mistakes discovered after Bid Opening or to withdraw a bid without forfeiture of bid security if a mistake is clearly evident on the face of the Bid or the intended correct bid is not evident and the low Bidder submits evidence within 24 hours after the Bids are opened which clearly and convincingly demonstrates that a mistake was made which:

- is of such a grave consequence that enforcement would be unconscionable and,
- relates to a material and fundamental feature of the bid and,
- the Bidder acted in good faith and the mistakes did not come about as a result of the violation of a positive legal duty or from gross negligence and,
- the Bidder gave prompt notice of the mistake prior to award of Bid and,
- the **Owner's** status has not been changed, or if changed, the **Owner** suffers no serious hardship or prejudice other than loss of the bargain.

Thereafter, if the Work is rebid, any Bidder that withdraws a Bid will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all minor Bid

informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

- 18.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 18.03 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 may 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, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

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 22—WAGE RATE REQUIREMENTS

- 22.01 The prevailing wage rates of the State of New Mexico Department of Workforce Solutions apply to this Contract as do any requirements for the State of New Mexico associated with the use of these State Prevailing Wages.
- 22.02 The prevailing wage rates of the U.S. Department of Labor apply to this project. The Contractor must comply with the minimum rates for wages for laborers and mechanics as determined by the Department of Labor in accordance with the provisions of the Davis-Bacon and Related Acts.
- 22.03 The Contractor shall pay the higher of the two prevailing wage rates on this Project.

BID FORM

BID FORM FOR CONSTRUCTION CONTRACT

PROJECT IDENTIFICATION:

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to: Town of Mesilla

2231 Avenida de Mesilla

Mesilla, New Mexico, 88046

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 for compliance with New Mexico Subcontractor's Fair Practices Act;
- 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. Bidder's Qualification Statement;
- H. Resident Contractor Certificate issued by the Taxation and Revenue Department (if seeking preference);
- I. Resident Veteran Contractor Certificate issued by the Taxation and Revenue Department (if seeking preference);

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

3.01 *Unit Price Bids*

- A. Bidder will perform the following Work at the indicated unit prices:

| Item No. | BID LOT #1 Description | Unit | Estimated Quantity | Bid Unit Price | Bid Price |
|----------|---|-------|--------------------|----------------|-------------|
| 1 | Mobilization | LOT | 1 | \$ 7,000.00 | \$ 7,000.00 |
| 2 | Construction Staking | LS | 1 | | |
| 3 | 4" PVC (C-900) Water line, including trenching & backfilling, complete in place | LF | 1,110 | | |
| 4 | 4" Gate Valve, including valve box, complete in place | EA | 2 | | |
| 5 | Water connection to 12", hot connection, 12"x 12" x 4" tapping tee, complete in place | EA | 1 | | |
| 6 | 4" Tapping Valve, including valve box, complete in place | EA | 1 | | |
| 7 | Ductile Iron Fittings | LB | 360 | | |
| 8 | Pavement Patch, including subgrade prep, 6" base course, 3" of asphalt surface course, complete in place | SY | 12 | | |
| 9 | Booster Station, include all improvements, within the fence, including grading, concrete, piping, pumps, tank, electrical limits, complete in place | LS | 1 | | |
| 10 | Combination Air/Vac Station, include meter box & lid, complete in place | EA | 1 | | |
| 11 | Demobilization and submittal of all close-out documents | LOT | 1 | \$ 3,500.00 | \$ 3,500.00 |
| 12 | Traffic Control, complete | LS | 1 | | |
| 13 | Relocation of Underground Utilities Allowance | ALLOW | 1 | \$ 3,000.00 | \$3,000.00 |

| Item No. | BID LOT #1 Description | Unit | Estimated Quantity | Bid Unit Price | Bid Price |
|----------|---|-------|--------------------|----------------|-------------|
| 14 | Contingency Allowance During Construction | ALLOW | 1 | \$ 5,000.00 | \$ 5,000.00 |
| 15 | Testing Allowance | ALLOW | 1 | \$ 3,500.00 | \$ 3,500.00 |

TOTAL BID LOT #1 AMOUNT (Exclusive of New Mexico Gross Receipts Tax) \$ _____

ADDITIVE ALTERNATE #1

| Item No. | AA #1 Description | Unit | Estimated Quantity | Bid Unit Price | Bid Price |
|----------|---|------|--------------------|----------------|-----------|
| 16 | Demolition of existing booster station, include all caping and purging of existing utilities, and disposal of all demo debris, and grading size to match contours, complete | LS | 1 | \$ | \$ |

TOTAL ADDITIVE ALTERNATE #1 AMOUNT (Exclusive of NM Gross Receipts Tax) \$ _____

ADDITIVE ALTERNATE #2

| Item No. | AA #2 Description | Unit | Estimated Quantity | Bid Unit Price | Bid Price |
|----------|--|------|--------------------|----------------|-----------|
| 17 | Booster station shade structure mounted to concrete pad, complete in place | LS | 1 | \$ | \$ |

TOTAL ADDITIVE ALTERNATE #2 AMOUNT (Exclusive of NM Gross Receipts Tax) \$ _____

PROJECT TOTAL BID LOT #1 + AA #1 + AA#2, (Exclusive of NM Gross Receipts Tax) \$ _____

- 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

- 4.01 This Contract will be awarded on the basis of the lowest responsive project total Bid received from a responsible Bidder. If the lowest acceptable Bid exceeds available funds, the Owner retains the right to reject all Bids or negotiate a change of scope with the lowest responsive Bidder. Owner may only negotiate up to 10% higher than the budgeted project funds. Such negotiation shall not be allowed if the lowest Bid is more than 10% over the budgeted project funds. If a change of scope is negotiated and effected, it will be in the form of a formal Change Order to the Contract. If these conditions are not satisfied, the Owner is required to reject all Bids and re-bid the project to comply with State procurement requirements.
- 4.02 This Contract includes two (2) preferences for the award of the Bid: (1) New Mexico Resident Contractor Preference and (2) Resident Veterans Preference Certification.
- A. To receive a Resident Contractor preference pursuant to Section 13-4-2 NMSA 1978 or a Resident Veteran Contractor preference pursuant to Section 13-1-21 NMSA 1978, a Bidder shall submit with its Bid a copy of a valid Resident Contractor Certificate or Resident Veteran Contractor Certificate issued by the Taxation and Revenue Department. In addition, if the Bidder is seeking the Resident Veteran Contractor preference, the Bidder shall submit with its Bid the Resident Veterans Preference Certification form.
- B. For the purpose of awarding, the following shall apply:
1. A Bid submitted by a Resident Contractor shall be deemed to be five percent (5%) lower than the Bid actually submitted.
 2. A Bid submitted by a Resident Veteran Contractor with annual revenues of up to Three Million Dollars (\$3,000,000) in the preceding tax year shall be deemed to be ten percent (10%) lower than the Bid actually submitted.
 3. A public body shall not award a Bidder both a Resident Contractor preference and a Resident Veteran Contractor preference.
 4. When a Joint Bid is submitted by a combination of Resident Veteran and Resident or Nonresident Contractor, the preference shall be calculated in proportion to the percentage of the Contract, based on the dollar amount of the Bid provided under the Contract that will be performed by each business as specified in the Joint Bid.

For information on obtaining a Resident Contractor Certificate or Resident Veteran Certificate, the potential Bidder should contact the State of New Mexico Taxation and Revenue Department, P.O. Box 5373, Santa Fe, New Mexico 87502-5374, telephone (505) 827-0951, or

on the web at <http://www.tax.newmexico.gov/forms-and-publications/pages/recently-updated.aspx>.

- 4.03 Gross receipts tax rates will be adjusted by the Contractor during the construction period to reflect the actual applicable rates issued by the New Mexico Taxation and Revenue Department.

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, other related data identified in 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 and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Bidder is familiar and is satisfied 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 (except Underground Facilities) 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.

ARTICLE 8—BID SUBMITTAL

8.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

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

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

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

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

Name (typed or printed): _____

Title: _____
(CORPORATE SEAL)

Attest _____

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

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

Bidder's Business Address _____

Phone No. _____ Fax No. _____

E-mail _____

SUBMITTED on _____, 20____.

8.02 Contractor License Information:

New Mexico Contractor's License Number _____

License Classifications _____

New Mexico Department of Workforce Solutions Registration Number _____

Federal Identification Number (FEIN #) _____

ARTICLE 9—PREFERENCES

9.01 Resident Contractor Preference:

Is Bidder claiming Resident Contractor Preference? _____

If Yes, provide a copy of your Resident Contractor Certificate issued by the Taxation and Revenue Department.

9.02 Resident Veteran Contractor Preference:

Is Bidder claiming Resident Veteran Contractor Preference? _____

If Yes, provide a copy of your Resident Veteran Contractor Certificate issued by the Taxation and Revenue Department.

BID BOND

BID BOND (PENAL SUM FORM)

| | |
|---|---|
| Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business] | Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business] |
| Owner Name: [Full formal name of Owner] Address <i>(principal place of business)</i> : [Address of Owner's principal place of business] | Bid Project <i>(name and location)</i> : [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due] |
| Bond Penal Sum: [Amount] Date of Bond: [Date] | |
| Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative. | |
| Bidder <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <i>(Full formal name of Bidder)</i> | Surety <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <i>(Full formal name of Surety) (corporate seal)</i> |
| By: _____ <div style="text-align: center;"><i>(Signature)</i></div> | By: _____ <div style="text-align: center;"><i>(Signature) (Attach Power of Attorney)</i></div> |
| Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div> | Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div> |
| Title: _____ | Title: _____ |
| Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div> | Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div> |
| Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div> | Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div> |
| Title: _____ | Title: _____ |
| <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> | |

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

**SUBCONTRACTOR'S FAIR PRACTICE
ACT COMPLIANCE**

SUBCONTRACTOR'S FAIR PRACTICE ACT COMPLIANCE

This project is subject to the provisions of the State of New Mexico Subcontractor's Fair Practice Act.

Listing Threshold: \$5,000.00

Portion of project to which requirements apply:

Complete Project.

For each category of the project, which the BIDDER will be subcontracting for an amount exceeding the listing threshold indicated above, the BIDDER shall define the subcontracting categories and list only one subcontractor for each category. The listing shall be in the format indicated on the following page, and shall be completed and submitted with the Bid.

No CONTRACTOR whose Bid is accepted shall sublet or subcontract any portion of the Work of the Project in an amount exceeding the threshold amount given above, where the original bid amount did not designate a subcontractor, unless 1) the CONTRACTOR received no bid for that category (note: the BIDDER must designate on the list of subcontractors that "no bid was received"), or 2) the Work is pursuant to a change order that causes changes or deviations from the original contract.

No CONTRACTOR whose Bid is accepted shall substitute any subcontractor in place of the subcontractor listed in the Bid except as provided for in the Subcontractor's Fair Practice Act.

Any changes or additions of subcontractors shall be promptly reported to the ENGINEER in writing within two (2) calendar days of the known change or addition to the submitted List of Project Subcontractors in the Bid.

All subcontractors with work in excess of \$60,000 must be registered with the New Mexico Department of Workforce Solutions, Labor Enforcement. On page SCFP-2, include the total of the subcontracted work and the subcontractor's New Mexico Department of Workforce Solutions Registration Number, if work is in excess of \$60,000.

LIST OF PROJECT SUBCONTRACTORS FOR
AMOUNTS EXCEEDING THE LISTING THRESHOLD

Subcontract Category _____

Estimated Value of Work _____

Subcontractor's Name _____

Business Address _____

Phone Number _____

E-mail Address _____

Federal Identification No. (FEIN #) _____

New Mexico Contractor's License No. _____

License Categories _____

New Mexico Dept. of Workforce Solutions Registration No. _____

(list only if value of work is in excess of \$60,000)

Subcontract Category _____

Estimated Value of Work _____

Subcontractor's Name _____

Business Address _____

Phone Number _____

E-mail Address _____

Federal Identification No. (FEIN #) _____

New Mexico Contractor's License No. _____

License Categories _____

New Mexico Dept. of Workforce Solutions Registration No. _____

(list only if value of work is in excess of \$60,000)

Subcontract Category _____
Estimated Value of Work _____
Subcontractor's Name _____
Business Address _____

Phone Number _____
E-mail Address _____
Federal Identification No. (FEIN #) _____
New Mexico Contractor's License No. _____
License Categories _____
New Mexico Dept. of Workforce Solutions Registration No. _____
(list only if value of work is in excess of \$60,000)

Subcontract Category _____
Estimated Value of Work _____
Subcontractor's Name _____
Business Address _____

Phone Number _____
E-mail Address _____
Federal Identification No. (FEIN #) _____
New Mexico Contractor's License No. _____
License Categories _____
New Mexico Dept. of Workforce Solutions Registration No. _____
(list only if value of work is in excess of \$60,000)

Signature of Authorized Representative for BIDDER:

_____ Date: _____

Duplicate, complete, and submit additional sheets as required.

AGREEMENT

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

This Agreement is by and between **Town of Mesilla** (“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:

Construction of a booster station including all piping, electrical, structural as shown on the plans and project manual labeled “Mesilla Water Sys Booster Pump Rplc. Construction a 4” water line from the new booster station to a point on the old system to replace the existing booster station

ARTICLE 2—THE PROJECT

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

The intent of the project is to construct a replacement booster station to supply water to the Town of Mesilla’s customer on the upper zone and demolish the existing booster station. This is to be done with minimal disruption of the water service to the residences on this water system.

ARTICLE 3—ENGINEER

3.01 The Project has been designed by Molzen-Corbin & Associates, Inc. (Engineer), which is to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

3.02 The part of the Project that pertains to the Work has been designed by Molzen-Corbin & Associates, Inc., (Engineer).

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 **160** 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 **160** 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 and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion*: Contractor shall pay Owner \$ **1,000.00** 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 \$ **1,000.00** for each day that expires after such time until the Work is completed and ready for final payment.
- 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. The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.
- B. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the **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.

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.

6.04 *Consent of Surety*

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

6.05 *Interest – Not Applicable*

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 (not attached but incorporated by reference) consisting of **[number]** sheets with each sheet bearing the following general title: **[title on Drawings]**.
 7. Drawings listed on the attached sheet index.
 8. Addenda (numbers **[number]** to **[number]**, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. **[list exhibits]**
 - b. Contractor's Bid
 - c. Contractor's Qualifications Statement
 - d. Contractor's Subcontractor List
 - e. Contractor's Equipment Supplier's List
 - f. Documentation Submitted by Contractor Prior to Notice of Award
 - g. Addenda 1 to _____, inclusive
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:

- a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND 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:

Contractor:

(typed or printed name of organization)

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Address for giving notices:

Designated Representative:

Designated Representative:

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Address:

Phone: _____

Phone: _____

Email: _____

Email: _____

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

License No.: _____
(where applicable)

State: _____

**CERTIFICATE OF
LIABILITY INSURANCE**



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | | | | | |
|---|--|--|--|-----------------------|--|
| PRODUCER Insurance Group Inc 1111 Insurance Blvd Albuquerque, NM | | CONTACT NAME: PHONE (A/C, No, Ext): E-MAIL ADDRESS: | | FAX (A/C, No): | |
| | | INSURER(S) AFFORDING COVERAGE | | NAIC # | |
| INSURED ABC Construction Company 1111 Construction Blvd Albuquerque, NM | | INSURER A : Insurance Company A | | | |
| | | INSURER B : Insurance Company B | | | |
| | | INSURER C : Insurance Company C | | | |
| | | INSURER D : Insurance Company D | | | |
| | | INSURER E : | | | |
| | | INSURER F : | | | |

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|----------|--|-------------------------------------|-------------------------------------|---------------|-------------------------|-------------------------|--|
| A | GENERAL LIABILITY | | | | | | EACH OCCURRENCE \$ 1,000,000 |
| | <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | | | DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 50,000 |
| | <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR | | | ##### | 01/01/20-- | 01/01/20-- | MED EXP (Any one person) \$ 10,000 |
| | <input checked="" type="checkbox"/> Owners & Contractors Prot. | | | | | | PERSONAL & ADV INJURY \$ 1,000,000 |
| | GEN'L AGGREGATE LIMIT APPLIES PER: | | | | | | GENERAL AGGREGATE \$ 2,000,000 |
| | <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC | | | | | | PRODUCTS - COMP/OP AGG \$ 2,000,000 |
| | | | | | | | \$ |
| B | AUTOMOBILE LIABILITY | | <input checked="" type="checkbox"/> | | | | COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 |
| | <input checked="" type="checkbox"/> ANY AUTO | | | | | | BODILY INJURY (Per person) \$ |
| | <input type="checkbox"/> ALL OWNED AUTOS | <input type="checkbox"/> | | ##### | 01/01/20-- | 01/01/20-- | BODILY INJURY (Per accident) \$ |
| | <input checked="" type="checkbox"/> HIRED AUTOS | <input checked="" type="checkbox"/> | | | | | PROPERTY DAMAGE (Per accident) \$ |
| | SCHEDULED AUTOS NON-OWNED AUTOS | | | | | | \$ |
| C | <input checked="" type="checkbox"/> UMBRELLA LIAB | <input checked="" type="checkbox"/> | | | | | EACH OCCURRENCE \$ 1,000,000 |
| | <input type="checkbox"/> EXCESS LIAB | <input type="checkbox"/> | | ##### | 01/01/20-- | 01/01/20-- | AGGREGATE \$ 1,000,000 |
| | <input type="checkbox"/> CLAIMS-MADE | | | | | | \$ |
| | DED <input checked="" type="checkbox"/> RETENTION \$ 10,000 | | | | | | |
| D | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY | | | | | | <input checked="" type="checkbox"/> WC STATU-TORY LIMITS |
| | ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? (Mandatory in NH) | Y/N | | | | | OT-H-ER |
| | If yes, describe under DESCRIPTION OF OPERATIONS below | | N/A | ##### | 01/01/20-- | 01/01/20-- | E.L. EACH ACCIDENT \$ 100,000 |
| | | | | | | | E.L. DISEASE - EA EMPLOYEE \$ 100,000 |
| | | | | | | | E.L. DISEASE - POLICY LIMIT \$ 500,000 |
| A | Boiler & Machinery Coverage | | | ##### | 01/01/20-- | 01/01/20-- | Equipment Breakdown: Contract Amount |
| | Builders Risk Coverage | | | | | | Builders Risk: Contract Amount |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

"Project Name" Additional Insured: Owner, Engineer, and Engineering Consultants, [New Mexico Department of Transportation (for projects requiring NMDOT Utility Permits)], and each of their Officers, Agents, and employees.

CERTIFICATE HOLDER**CANCELLATION**

| | |
|-------------------------------|--|
| Owner Name Owner's Address | SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. |
| | AUTHORIZED REPRESENTATIVE |
| | SIGNATURE |

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OTHER INSURANCE CERTIFICATE/POLICY REQUIREMENTS

Owner's Protective Liability Insurance:

Certificate before execution of Agreement
Policy before beginning work

Builder's All-Risk Insurances

Certificate before execution of Agreement

See Owner's Supplemental Conditions for other conditions regarding insurance, certificates, insureds, and other provisions.

See Information for Bidders for requirement to pay for review(s) of resubmittal of insurance certificates and/or bonds.

PERFORMANCE BOND

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: [Full formal name of Owner]</p> <p>Mailing address (<i>principal place of business</i>): [Address of Owner's principal place of business]</p> | <p>Contract</p> <p>Description (<i>name and location</i>): [Owner's project/contract name, and location of the project]</p> <p>Contract Price: [Amount from Contract]</p> <p>Effective Date of Contract: [Date from Contract]</p> |
| <p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 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: **[Describe modification or enter “None”]**

PAYMENT BOND

PAYMENT BOND

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

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

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

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

NOTICE OF AWARD

NOTICE OF AWARD

Date of Issuance:

Owner:

Owner’s Project No.:

Engineer:

Engineer’s Project No.:

Project:

Contract Name:

Bidder:

Bidder’s Address:

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

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

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

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

Drawings will be delivered separately from the other Contract Documents.

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

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

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

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

Owner: **[Full formal name of Owner]**

By (signature): _____

Name (printed): _____

Title: _____

Copy: Engineer

NOTICE TO PROCEED

NOTICE TO PROCEED

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

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

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

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

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

[or]

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

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

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

Owner: **[Full formal name of Owner]**
By (*signature*): _____
Name (*printed*): _____
Title: _____
Date Issued: _____
Copy: Engineer

STANDARD GENERAL CONDITIONS

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**

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

1.01 *Definitions*

SC-1.01 Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

1. *Geotechnical Data Report (GDR)*—The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

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 **five (5)** printed copies of the Contract Documents and **one (1) copy** in electronic portable document format (PDF).

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

- A. Owner shall furnish to Contractor **two (2)** printed copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No suggested Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

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.

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

5.03 *Subsurface and Physical Conditions*

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

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

| Report Title | Date of Report | Technical Data |
|--------------|----------------|----------------|
| NONE | | |
| | | |
| | | |

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

| Drawings Title | Date of Drawings | Technical Data |
|----------------------------|------------------|--|
| Record drawings of well #2 | 1996 | Building, Piping, Mechanical, Electrical |
| | | |
| | | |

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

5.06 *Hazardous Environmental Conditions*

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

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

| Report Title | Date of Report | Technical Data |
|--------------|----------------|----------------|
| NONE | | |
| | | |
| | | |

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

| Drawings Title | Date of Drawings | Technical Data |
|----------------|------------------|----------------|
| NONE | | |
| | | |
| | | |

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

6.02 *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 Add the following paragraph immediately after Paragraph 6.03.A:

1. Worker's Compensation / Employer's Liability:
 - a. State Statutory
 - b. Applicable Federal: Statutory
 - c. Employer's Liability:
 - 1) \$1,000,000 Bodily Injury Each Accident
 - 2) \$1,000,000 Bodily Injury Policy Limit
 - 3) \$1,000,000 Bodily Injury Each Employee
 - d. In states with monopolistic state funds, include evidence of the stop-gap endorsements to either the General Liability or Employer's Liability policy.
2. Commercial General Liability, which must include premises/operations products/completed operations, independent Contractors, blanket contractual liability and personal injury under Paragraphs 5.04.A.3. through A.6. of the General Conditions:
 - a. \$1,000,000 Each Occurrence
 - b. \$1,000,000 Personal and Advertising Injury
 - c. \$2,000,000 Products/Completed Operations
 - d. \$2,000,000 General Aggregate
 - e. Commercial Excess/Umbrella Liability
 - 1) \$1,000,000 Each Occurrence
 - 2) \$1,000,000 Aggregate
3. Commercial Automobile covering owned and/or non-owned and hired automobiles under Paragraph 5.04.4.6. of the General Conditions:
 - a. \$1,000,000 Bodily Injury
 - b. \$1,000,000 Property Damage, or
 - c. \$1,000,000 Combined Single Limit

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

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess,

pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds Owner and Engineer.

- E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).
- F. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverages for not less than the following amounts or greater where required by law or regulations. The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. All policies shall be endorsed to provide Engineer and Owner 30 days' written notice prior to cancellation and 10 days' notice if cancelled for non-payment.
- G. *Additional Insured Coverage Required Commercial General Liability and Commercial Auto Liability.* To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Engineer, and the Engineer's consultants as additional insureds for claims caused in whole or in part by the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Engineer's and Owner's general liability and auto insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10, CG 20 37 and with respect to the Engineer and the Engineer's Consultants, CG 20 32, or their equivalent. Worker's Compensation, Commercial General Liability and Commercial Auto policies shall contain a Waiver of Subrogation in favor of Owner and Engineer.
- H. *Owner's Liability Insurance.* The Contractor shall be responsible for purchasing and maintaining through the life of the Contract, at no cost to the Owner, an Owner's and Contractor's Protective Liability Insurance policy in the name of the Owner with the Engineer and his consultants, and the New Mexico Environment Department, and each of their officers, agents, and employees, as Additional Insureds. Such insurance shall have the same limits as the Commercial General Liability Insurance Coverage.

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- F. *Builder's Risk Requirements:* The builder's risk insurance must:
 - 1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials

and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

- a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).
 4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of **\$1,000,000**.
 5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of **the value of property in transit, or \$1,000,000, whichever is less**.
 6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
 7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
 8. include performance/hot testing and start-up, if applicable.
 9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
 10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such

builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

11. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of \$100,000.
- G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.
- H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.
 1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$100,000 for direct physical loss in any one occurrence.
- I. *Property Insurance:* Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall:
 1. include the interests of Owner, Contractor, Subcontractors, Engineer, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or loss payee.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 Labor; Working Hours

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.

SC-7.03 Add the following new subparagraph immediately after Paragraph SC-7.03.D:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as **1.5 times the hourly rate**.

7.17 Contractor's General Warranty and Guarantee

SC-7.17 Add the following new subparagraph immediately after Paragraph SC-7.17.A.:

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

ARTICLE 8—OTHER WORK AT THE SITE

8.02 *Coordination*

ARTICLE 9—OWNER’S RESPONSIBILITIES

9.13 *Engineer’s Status During Construction*

ARTICLE 10—ENGINEER’S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

SC-10.03 Add the following new subparagraph immediately after Paragraph 10.03.A:

1. On this Project, by agreement with the Owner, the Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.

ARTICLE 11—SC-10.03 CHANGES TO THE CONTRACT

11.05 *Owner-Authorized Changes in the Work*

SC-11.05 Add the following new paragraphs immediately after Paragraph 11.05.C:

- D. A line item in the amount of \$ 5000.00 has been included in the Bid Proposal for Pre-Authorized Changes During Construction. This amount will be used to pay for Contractor’s actual costs incurred to perform certain Changes to the Work necessary to complete the Project that may be authorized by the Engineer. The Contractor will only be paid for those Changes to the Work that have been specifically authorized in writing by the Engineer, Owner, and NMED-CPB. Article 11 of the General Conditions applies to all payment for any items of work performed as Pre-Authorized Changes During Construction. All Change Orders require approval from the Engineer, Owner, and NMED-CPB.

ARTICLE 12—CLAIMS

No suggested Supplementary Conditions in this Article.

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

13.01 *Cost of the Work*

SC-13.01 Add the following new paragraph immediately after Paragraph 13.01.B.5.c.3):

- 4) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book for Construction Equipment (Contractor will provide published documentation of Rental Rate). An hourly rate will be computed by dividing the monthly rates by 173.3. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

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

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

13.03 *Unit Price Work*

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

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the extended price of a particular item of Unit Price Work amounts to **10** percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than **10** percent 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

14.04 Acceptance of Defective Work

SC-14.04 Add the following new Paragraph 14.04.B

- B. Acceptance of defective work must be approved by the New Mexico Environment Department (NMED) – Construction Program Bureau (CPB).

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

15.01 *Progress Payments*

SC-15.01 Add the following new Paragraph 15.01.F:

- F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

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 new paragraphs immediately following Paragraph 15.06.A.3.:

4. Contractor shall submit the following to receive Final Payment:
 - a. Certification of Substantial Completion
 - b. Record Drawing Markups.
 - c. Vendor Final Operation and Maintenance Manuals.
 - d. Vendor Warranties and Bonds.
 - e. Spare Parts and Maintenance Materials.
 - f. Consent of Surety Company to Final Payment.
 - h. Final Payment Application
 - i. Affidavit of Payment and Release of Liens.

5. Engineer/Owner must submit the following documents to NMED-CPB for NMED to release Final Payment.
 - a. Certificate of Project Acceptance and Performance.
 - b. Letter from Owner Accepting O&M Manuals and Record Drawings.
 - c. Final Pay Request and Final Adjusting Change Order.
- SC-15.06 Delete Paragraph 15.06.E. of the General Conditions in its entirety and insert the following in its place:
- E. Forty-five days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

SC-16.05 Add the following new Paragraph 16.05.

16.05 Notification to Funding Agency

- A. New Mexico Environment Department (NMED)– Construction Program Bureau (CPB) is to be notified within 7 days if the contract time is suspended to terminated.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.02 *Attorneys' Fees*

SC-17.02 Add the following new Paragraph immediately after Paragraph 17.01.

- 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

SC-18.11 Add the following new Paragraph 18.11

18.11 Funding agency Non-Appropriation Clause.

- A. 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 Town of Mesilla may immediately terminate this Agreement by giving Contractor written notice of such termination. The Town of Mesilla'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 Town of Mesilla or the New Mexico Environment Department or the State of New Mexico in the event of immediate or Early Termination of this Agreement by the Town of Mesilla or the Department.

SC-18.11 Add the following new Paragraph 18.11

18.11 Funding agency Termination Clause.

- A. This contract is funded in whole or in part by funds made available under a New Mexico Environment Department Grant Agreement. Should the New Mexico Environment Department early terminate the grant agreement, the Town of Mesilla may early terminate this contract by providing Contractor written notice of such termination. In the event of termination pursuant to this paragraph, the Town of Mesilla's only liability shall be to pay Contractor for acceptable goods delivered and services rendered before the termination date.

CHANGE ORDER FORM

CHANGE ORDER NO.: [Number of Change Order]

Owner:
 Engineer:
 Contractor:
 Project:
 Contract Name:
 Date Issued:

Owner's Project No.:
 Engineer's Project No.:
 Contractor's Project No.:

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 (if applicable)

By: _____
 Title: _____
 Date: _____

**CERTIFICATE OF SUBSTANTIAL
COMPLETION**

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:
Engineer:
Contractor:
Project:
Contract Name:

Owner's Project No.:
Engineer's Project No.:
Contractor's Project No.:

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

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

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

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

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

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

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

Amendments to Owner's Responsibilities: None As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

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

[List attachments such as punch list; other documents]

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

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

STATE WAGE RATES



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.
- 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.
- When the project has been completed, make sure the Affidavits of Wages Paid (AWP) are sent to the contracting agency.
- All subcontractors and tiers (excluding professional services) regardless of contract amount must pay prevailing wages, be listed on the Subcontractor List, and adhere to the Public Works Minimum Wage Act.



LABOR RELATIONS DIVISION

401 Broadway NE
Albuquerque, NM 87102
Phone: 505-841-4400
Fax: 505-841-4424

WWW.DWS.STATE.NM.US

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.
- 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 pay prevailing wages, be listed on the Subcontractor List, and adhere to the Public Works Minimum Wage Act.

Additional Information

Reference material and forms may be found in the 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@state.nm.us or call (505) 841-4400.



LABOR RELATIONS DIVISION

401 Broadway NE
Albuquerque, NM 87102
Phone: 505-841-4400
Fax: 505-841-4424

226 South Alameda Blvd
Las Cruces, NM 88005
Phone: 575-524-6195
Fax: 575-524-6194

WWW.DWS.STATE.NM.US

1596 Pacheco St, Suite 103
Santa Fe, NM 87505
Phone: 505-827-6817
Fax: 505-827-9676

Wage Decision Approval Summary

1) Project Title: Mesilla Water System Booster Pump Replacement
Requested Date: 11/09/2022
Approved Date: 11/09/2022
Approved Wage Decision Number: DA-22-2737-A

Wage Decision Expiration Date for Bids: 03/09/2023

2) Physical Location of Jobsite for Project:
Job Site Address: Raasaf Circle
Job Site City: Las Cruces
Job Site County: Dona Ana

3) Contracting Agency Name (Department or Bureau): Town of Mesilla
Contracting Agency Contact's Name: Rani Bush
Contracting Agency Contact's Phone: (575) 524-3262 Ext. 105

4) Estimated Contract Award Date: 12/27/2022

5) Estimated total project cost: \$320,000.00
a. Are any federal funds involved?: No
b. Does this project involve a building?: No
c. Is this part of a larger plan for construction on or appurtenant to the property that is subject to this project?: No
d. Are there any other Public Works Wage Decisions related to this project?: No
e. What is the ultimate purpose or functional use of the construction once it is completed?: The ultimate purpose of this project is to restore recommended water pressure to residences.

6) Classifications of Construction:

| Classification Type and Cost Total | Description |
|---|--|
| Highway/Utilities (A) Cost: \$320,000.00 | Construction of a water booster station and waterline improvements. Located adjacent to existing well. |



TYPE “A” – STREET, HIGHWAY, UTILITY & LIGHT ENGINEERING

Effective January 1, 2022

| Trade Classification | Base Rate | Fringe Rate |
|---|------------------|--------------------|
| Bricklayer/Block layer/Stonemason | 24.46 | 8.81 |
| Carpenter/Lather | 26.48 | 12.14 |
| Carpenter- Los Alamos County | 29.24 | 13.94 |
| Cement Mason | 17.74 | 7.41 |
| Drywall Finisher/Taper | 25.21 | 8.00 |
| Glazier | | |
| Glazier/Fabricator | 21.00 | 6.45 |
| Delivery Driver | 11.50 | 6.45 |
| Ironworker | 27.70 | 17.89 |
| Painter- Commercial | 17.75 | 8.20 |
| Paper Hanger | 17.75 | 8.20 |
| Plumber/Pipefitter | 33.10 | 13.10 |
| Electricians- Outside Classifications: Zone 1 | | |
| Ground man | 24.57 | 11.74 |
| Equipment Operator | 35.25 | 16.06 |
| Lineman | 44.32 | 18.08 |
| Journeyman technician | 41.47 | 17.37 |
| Cable Splicer | 48.75 | 19.19 |
| Electricians-Outside Classifications: Zone 2 | | |
| Ground man | 24.57 | 11.74 |
| Equipment Operator | 35.25 | 16.06 |
| Lineman | 44.32 | 18.08 |
| Journeyman technician | 41.47 | 17.37 |
| Cable Splicer | 48.75 | 19.19 |
| Electricians-Outside Classifications: Los Alamos | | |
| Ground man | 25.27 | 11.76 |
| Equipment Operator | 36.27 | 16.09 |

| | | |
|--------------------------|-------|-------|
| Lineman | 45.47 | 18.36 |
| Journeyman technician | 42.41 | 17.60 |
| Cable Splicer | 49.59 | 19.40 |
| Laborers | | |
| Group I | 14.79 | 6.93 |
| Group II | 15.29 | 6.93 |
| Group III | 16.79 | 6.93 |
| Group IV | 17.29 | 6.93 |
| Operators | | |
| Group I | 19.93 | 6.74 |
| Group II | 20.92 | 6.74 |
| Group III | 21.02 | 6.74 |
| Group IV | 21.14 | 6.74 |
| Group V | 21.24 | 6.74 |
| Group VI | 21.44 | 6.74 |
| Group VII | 21.61 | 6.74 |
| Group VIII | 21.92 | 6.74 |
| Group IX | 29.87 | 6.74 |
| Group X | 33.32 | 6.74 |
| Soft Floor Layers | 20.75 | 8.45 |
| Truck Drivers | | |
| Group I-IX | 17.65 | 8.72 |

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.

LIST OF DRAWINGS

LIST OF DRAWINGS

| <u>SEQ.</u> | <u>SHEET</u> | <u>DESCRIPTION</u> |
|------------------------|--------------|---|
| <u>GENERAL</u> | | |
| 1 | G-001 | TITLE SHEET |
| 2 | G-002 | GENERAL NOTES |
| 3 | G-003 | LOCATION MAP |
| 4 | G-101 | PROJECT SITE DEMOLITION PLAN |
| 5 | G-102 | MECHANICAL DEMOLITION PLAN |
| <u>CIVIL</u> | | |
| 6 | C-101 | GRADING PLAN |
| 7 | C-201 | PLAN & PROFILE STA. 10+00 TO STA. 14+60 |
| 8 | C-202 | PLAN & PROFILE STA. 14+60 TO STA. 18+60 |
| 9 | C-203 | PLAN & PROFILE STA. 18+60 TO STA. 21+28 |
| 10 | C-501 | UTILITY DETAILS |
| 11 | C-502 | UTILITY DETAILS |
| <u>WATER RESOURCES</u> | | |
| 12 | W-101 | BOOSTER STATION EQUIPMENT & PIPING PLAN – SECTION & KEY NOTES |
| <u>STRUCTURAL</u> | | |
| 13 | S-101 | SHADE STRUCTURE PLAN |
| 14 | S-102 | SHADE STRUCTURE SECTION |
| <u>ELECTRICAL</u> | | |
| 15 | E-101 | ELECTRICAL SITE PLAN |
| 16 | E-401 | ELECTRICAL WELL 2 BUILDING ENLARGED PLAN |
| 17 | E-501 | ELECTRICAL VARIOUS INSTALLATION DETAILS |
| 18 | E-601 | ELECTRICAL DIAGRAMS & SCHEDULES |

TECHNICAL SPECIFICATIONS

SECTION 01 00 01

SPECIFICATION FORMAT

PART 1 GENERAL

1.01 FORMAT

- A. The Division 1 through 48 Specifications are written in imperative and abbreviated form. This imperative language is directed at the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting “shall”, “the Contractor shall”, and “shall be” or similar mandatory phrases by inference in the same manner as they are applied to notes on the Drawings. The words “shall be” are to be placed by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, the Contractor shall fulfill (perform) all indicated requirements whether stated imperatively or otherwise.
- B. All equipment and facilities shall be furnished, installed, and constructed by the Contractor to provide the Owner with complete, ready to use components, systems, and facilities. All necessary materials and Work required to accomplish this are the responsibility of the Contractor alone, whether or not specifically indicated on the Drawings or stated in the Specifications.
- C. The various Sections of the Division 1 through 48 Specifications may contain references to standards, other specification sections, or items that do not apply to the Work covered in this project. These inappropriate references are to be considered irrelevant and ignored by the Contractor. If conflicts arise from erroneous references or lack of references to standards or other specification sections, Engineer will determine the relevancy of the apparent conflicts.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work under this Contract consists of constructing a new booster station and connecting line in accordance with the Drawings and these Specifications for the Town of Mesilla.

1.02 DESCRIPTION

- A. Work included under this Contract:
 1. Construct approximately 1110 feet of 4-inch water line with associated shutoff valves, air release/vacuum valve stations, and appurtenances.
 2. Construct Booster Station.
 3. Construct the water line facilities within Dona Ana County right-of-way, and Federal Land (Bureau of Land Management) easements.
 4. Construct all work with full compliance of Permit Requirements from Dona Ana County, and the United States Department of Interior – Bureau of Land Management.
 5. Demolish existing booster station.

1.03 CONTRACT

- A. The Work shall be performed under unit price bid items and reimbursable allowances.

1.04 SUMMARY BY REFERENCES

- A. Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, Addenda and Modifications to the Contract Documents issued subsequent to the initial printing of this Project Manual and including, but not necessarily limited to, printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon, including weather conditions and other forces outside the Contract Documents.

1.05 CONTRACTOR USE OF THE PREMISES

- A. The immediate premises of work will be at the disposal of the Contractor during the construction period.

1.06 SPECIAL CONDITIONS

- A. Demolish existing booster station:

1. Dispose of material in accordance with local, state and federal regulations.

1.07 FILL MATERIAL

- A. All fill material provided by Contractor shall be in full compliance with requirements stipulated in Section 31 23 00 – Excavation and Fill, Section 3 123 33 – Trenching and Backfilling, and where specified elsewhere in the Contract Documents.
- B. Contractor is solely responsible for providing suitable backfill material where needed at no additional cost to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXECUTION

- A. General: Immediately after award of the Contract, thoroughly and clearly advise all necessary personnel as to the nature and extent of the project.

END OF SECTION

SECTION 01 12 16

WORK SEQUENCE AND SPECIAL PROJECT REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL DESCRIPTION OF WORK SEQUENCE

- A. Part 1 – Booster Station
 - 1. Construction Booster Station
- B. Part 2 - Construct 4-inch water line and appurtenances as shown on Drawings.
 - 1. Connection to existing 12-inch water line.
 - 2. Complete all trenching, backfilling, compaction, flushing, cleaning, pressure testing, and disinfection of water transmission line and appurtenances.
 - 3. Submit all compaction tests, pressure tests and disinfection tests results to Engineer. Submit test results as tests are completed.
 - 4. Make all connection to existing water system and provide parallel operation for 7 days before demolition of the existing booster station can begin.
- C. Part 3 – Demolish existing booster station
 - 1. Complete removals of structure, electrical, piping.
 - 2. Purge and cap all pipes, remove wire from conduits.
 - 3. Fill void left by the existing booster station.
 - 4. Grade site to natural grades of the surroundings
- D. All Work noted for Part 2 may be constructed concurrently.

1.02 COORDINATION AND GENERAL REQUIREMENTS

- A. Contractor shall coordinate, schedule, and execute work so the Owner's ability to continuously convey and transfer water with its existing facilities and/or new facilities is never hindered.
- B. Do not operate or adjust existing valves without specific case-by-case approval of Owner's water department manager. After shakedown, do not operate or adjust new valves unless Owner's water department manager is notified and such action is needed for training, warranty work or emergencies.
- C. Emergency Response:
 - 1. Contractor's representative available at all times to respond to emergencies related to Work.
 - 2. Provide response within 60-minutes of notice.
 - 3. Provide positive method of contacting Contractor's representatives by Engineer and by Owner's representative at any time.

- D. Contractor is responsible for all damages during the course of construction resulting from breaking existing pipes, spills and any other discharge violations during construction.
- E. This project has been identified as requiring paleontological monitoring during the trenching operations within BLM property (Sta.10+00 to 12+80). The contractor shall coordinate closely with the paleontological consultant. Minor delays as a result of this monitoring may occur and shall be considered incidental to construction.

1.03 RELATED SECTIONS

- A. Section 02 41 00 - Demolition
- B. Section 01 74 17 – Storm Drainage Discharge Compliance

1.04 FACILITIES REQUIREMENTS

- A. General: Applies to work noted in Paragraph 1.01.
 - 1. Pressure Testing, Flushing and Disinfection of Waterlines:
 - a. Contractor to prepare and submit plan for pressure testing, flushing and disinfection of waterlines to Engineer, as specified in Section 33 13 13 – Disinfection of Domestic Water Systems.

1.05 SPECIAL REQUIREMENTS FROM OWNER-PROVIDED PERMITS

- A. The Owner has acquired permits from, Dona Ana County, and the United States Department of the Interior – Bureau of Land Management (BLM) to construct the new waterline for this project. Contractor must comply with **ALL** requirements noted in the respective Permit.
 - 1. The Owner delegates compliance of all applicable items in the respective Permit to the Contractor.
 - 2. Contractor is instructed to comply with **ALL** Permit requirements.
- B. Dona Ana County Permit:
 - 1. Contractor shall comply with permit requirements (at no additional cost to Owner) identified in the Permit.
 - 2. The Owner delegates compliance of all applicable items in the Permit to the Contractor.
- C. United States Department of the Interior – Bureau of Land Management (BLM) Permit:
 - 1. The Owner delegates compliance of all applicable items in the Permit to the Contractor.
 - 2. Contractor shall comply with all BLM Permit requirements (at no additional cost to Owner) noted in the Permit. Some of the **MAJOR** requirements of the referenced Permits include the following and are noted here solely for the Contractor's convenience. However, the Contractor must comply with **ALL** requirements noted in the respective Permit, such as but not limited to:

- a. **Blading of all vegetation will not be allowed.** Blading is defined as the complete removal of brush and ground vegetation. **Clearing of brush species will be allowed.** Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, etc.) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface. In areas where blading and/or clearing is allowed, the maximum width of these operations will not exceed 20 feet.
- b. The Contractor shall minimize disturbance to existing fences and other improvements on public lands. The Contractor is required to promptly repair impacted improvements to at least their former state. The Contractor shall contact the Owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence will be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the BLM Authorized Officer.

1.06 ADJUSTMENTS TO SEQUENCING REQUIREMENTS

- A. The Owner may require the Contractor to make adjustments to the requirements of the Section to accommodate unforeseen conditions and situations. Reasonable adjustments shall be made by the Contractor at no additional cost to the Owner or additional Contract time.

1.07 SUBSTANTIAL COMPLETION

- A. Refer to Section 01 77 00 – Contract Closeout, for description of Substantial Completion.

1.08 SPECIAL CONSIDERATIONS

- A. Provide all necessary power generation equipment or temporary electrical power supply for construction.
- B. Provide temporary pumps, power generator, piping, fittings, labor, and equipment to produce water for construction, testing, flushing, and disinfection of water lines.

1.09 TIME EXTENSIONS FOR ABNORMAL AND UNFORSEEABLE WEATHER (ADVERSE WEATHER DELAYS)

- A. This provision specifies the procedure for the determination of time extensions for abnormal and unforeseeable weather in accordance with General Conditions Section 12.03 - Delays. In order for the Engineer to award a time extension under this clause, the following conditions must be satisfied:
 - 1. The weather experienced at the project site during the contract period must be found to be unusually severe; that is, more severe than the adverse weather anticipated for the project location during any given month.

2. The abnormal and unforeseeable weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.
- B. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather-dependent activities.

Monthly Anticipated Adverse Weather Delay
Work Days Based on 5-Day Work Week

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 3 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 2 |

- C. An actual adverse weather day must prevent work for 50 percent or more of the Contractor's workday, delay work critical to the timely completion of the project, and be documented by the Contractor. The Owner's representative observing the construction shall determine on a daily basis whether or not work can proceed on a given date, within two (2) calendar days of that date. The Owner will use the above-written notification in determining the number of working days for which work was delayed during each month.
- D. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph (B) above, the Engineer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECTION (NOT USED)

END OF SECTION

SECTION 01 14 02

UTILITY OBSTRUCTIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. General provisions for handling utility obstructions and relocations.

1.02 UTILITIES SHOWN ON DRAWINGS

- A. The Engineer has made reasonable efforts to show the general location of existing underground and overhead utility lines on the Drawings; however, Contractor shall recognize that buried utilities may not be in the locations shown on the Drawings, or there may be other utilities that are not shown on the Drawings.

1.03 CONTRACTOR RESPONSIBILITIES

- A. For excavation work in New Mexico, Contractor is responsible to comply with the New Mexico Excavation Law (NMEL), as published in New Mexico Statutes Annotated (NMSA) 1978, section 62-14. Section 62-14-3 of the law requires the excavating Contractor to:
 - 1. Call the local notification center of NM811 One-Call in advance of excavating.
 - 2. NM811 One-Call will notify utility owners or operators to locate and mark their utilities.
 - 3. Notify directly all utility owners or operators who are not members of the local one-call center to locate and mark their utilities.
 - 4. In general, any utility located on the Owner's plant or station property belongs to the Owner past the utility meter or other termination point. The Owner is responsible to locate and mark such utilities.
 - 5. Do not start excavation until all utility owners have located and marked their utilities.
 - 6. Do not use mechanical excavation equipment, including bores and plows, within 18-inches horizontally of the utility marks (tolerance zone) and continue excavation in a manner necessary to prevent damage.
 - 7. Repair any damage to utilities caused by Contractor, and report to utility owner and NM811 One-Call.
- B. Additional Owner Requirements:
 - 1. Use non-mechanical means of excavating within 18-inches of marked utilities to expose the utilities such as by hand digging or vacuum/dry type potholing.
- C. Comply with requirements of Section 01 12 16 – Work Sequence and Special Project Requirements.
- D. This work will be considered incidental Work to the Contract Documents' bid items.

1.04 RELOCATION OF OVERHEAD UTILITIES

- A. Determine in advance of construction operations if overhead utility lines, support structures, poles, guys, etc., whether shown on the Drawings or not, will obstruct construction operations. If any obstruction to construction operations is evident, coordinate with the appropriate utility company to remove or relocate the utility obstructions. Any charges by any utility company for removal or relocation of overhead utilities are the sole responsibility of the Contractor at no additional cost to the Owner.

1.05 RELOCATION OF UNDERGROUND UTILITIES

- A. Determine in advance of construction operations locations of all underground utilities (gas, telephone, fiber optic cable, electrical, cable TV, water, sewer), whether shown on the Drawings or not, that may interfere with Contractor's construction operations.
- B. All Underground Utilities Except Water and Sewer Lines: Coordinate with the appropriate utility company to remove or relocate the existing utilities which interfere with construction. Utility company charges for relocating these existing utilities will be paid from the utility line relocation allowance listed on the Bid Proposal.
- C. Water and Sewer Lines:
 - 1. Adjust alignment on any waterline which Contractor is constructing to avoid existing underground utility lines and/or to maintain a minimum three feet of cover; Take other measures necessary (encasement of water or sewer line, change of pipe material, etc.) to protect new and existing lines.
 - 2. Adjust alignment of all existing waterlines as appropriate or required to avoid interference with:
 - 3. new sewer lines, or;
 - 4. new structures, or;
 - 5. new roadway, or;
 - 6. to maintain at least three feet of cover over existing waterlines unless otherwise approved in writing by Engineer.
 - 7. The following incidental work to be performed at no additional cost to Owner: All work required to adjust alignment of new waterlines around any existing waterlines or sewer lines, or other measures necessary to protect new and existing lines.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 03

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABLE CODES AND ORDINANCES

- A. All Work shall conform to the current versions of all applicable building, mechanical, plumbing, and electrical codes.
- B. Contractor is responsible for acquiring all applicable building, mechanical, plumbing, and electrical permits related to this project.
- C. Comply with all local laws, ordinances, and regulations which may impact Contractor's work.

1.02 OSHA REQUIREMENTS

- A. All equipment and facilities provided, including but not limited to, handrails, guardrails, grating, hoists, equipment guards, ladders, etc., shall meet OSHA requirements whether or not such requirements are specifically indicated or described in the Contract Documents.
- B. Any conflicts between OSHA requirements and Contract Documents shall be brought to the attention of the Engineer on a timely basis for resolution.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 16.01

COORDINATION WITH PUBLIC AND UTILITY INTERRUPTIONS

PART 1 GENERAL

1.01 PUBLIC ACCESS

- A. Provide for continuous public access to all residences, businesses, and properties via existing roads, alleys, and driveways whenever practical.
- B. Provide alternate public access to all residences, businesses, and properties in coordination with affected residents and occupants when existing access arrangements must be disrupted by Contractor's work whenever practical.
- C. Notify public at least three (3) calendar days in advance of interrupting public access.

1.02 UTILITY INTERRUPTIONS

- A. Coordinate any water shut-off operation with the Owner not less than three (3) working days prior to initiating any work affecting existing water utilities. Limit water service shut-off to four (4) hours. Keep Owner informed of work areas on a daily basis, and specifically notify Owner of areas where fire hydrants will be out of service.
- B. Notify all customers at least three (3) calendar days in advance of interrupting utility service.
- C. Keep interruptions of utility service at a minimum as to number of users and duration.

1.03 NOTICES

- A. Construction Notices Before Construction:
 - 1. Delivered not more than seven (7) calendar days nor less than four (4) calendar days prior to actual physical construction on each line or line segment.
 - 2. Corrected notices delivered if construction does not start within 48 hours of date given in notice.
 - 3. Written notice to state:
 - a. Contractor's name, address, and local telephone number.
 - b. Nature of work to be done.
 - c. Disruption residents or businesses might expect.
 - d. Expected duration of construction.
 - e. Contractor's local telephone number to which complaints may be made during normal working hours.
 - f. Contractor's local telephone number to which emergency conditions can be reported during non-working periods.

- B. Construction Notices After Construction:
 - 1. Delivered not more than seven (7) calendar days following construction on each line or line segment.
 - 2. Written notice to state:
 - a. Contractor's name, address, and telephone number.
 - b. Thank residents and businesses for cooperation and report work is completed in applicable area.

- C. Special Notices:
 - 1. Inform residents and businesses personally and by written notice whenever access to property will be impaired or utility service will be interrupted, stating scheduling of such action.

- D. Notice Delivery:
 - 1. Hand delivery to each resident and business adjacent to or which may be reasonably expected to be affected by construction.
 - 2. Do not deliver notices in mail boxes or mail slots. Use other delivery methods such as door hangers.

1.04 SCHEDULE OF SPECIAL REQUIREMENTS FOR THIS PROJECT

- A. Provide all notices included above, for the residents on this system. Coordinate this effort with the Town.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 19

USE OF SITE

PART 1 GENERAL

1.01 AVAILABLE SITES

- A. Sites and easement limits available for the construction of the project are shown on the Drawings. Contractor shall not utilize any land not indicated as being available without the written approval of the applicable landowner.
- B. If the Contractor requires the entire width of right-of-way or easement for construction, it shall be the Contractor's responsibility to have a licensed land surveyor establish the right-of-way line where it is not apparent.

1.02 PROTECTION AND RESTORATION

- A. All existing features and improvements to or on easements shall be restored by the Contractor equivalent to those existing prior to construction at no additional cost to the Owner. Compliance with special requirements or considerations indicated on the Drawings for the use of easements shall be the Contractor's responsibility at no additional cost to the Owner.
- B. Trees within construction easement shall be preserved to maximum practical extent, unless specifically indicated in the Drawings.

1.03 SPECIAL CONSTRUCTION METHODS

- A. Special and hand construction methods may be required to remain within the available easements. Such methods shall be used by the Contractor at no additional cost to the Owner.
- B. Other Contractors could be working on related work at or near the site; therefore, the Contractor is expected to cooperate and provide adequate access to all other working parties at or near the site.

1.04 STAGING AREAS

- A. Staging area is not provided by the Owner. Locating staging area(s) on private land is the responsibility of the Contractor. Contractor staging areas shall be provided by the Contractor at no additional cost to the Owner. Contractor staging areas are to be considered incidental Work to the Contract Documents' bid items.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedure for administration of Allowances.

1.02 RELATED REQUIREMENTS

- A. Individual Technical Specification sections listed under “Schedule of Allowances” at the end of this Section.

1.03 ALLOWANCE

- A. The allowance is a sum of money included in the Contract Price to cover the cost of a service, all inclusive, to be provided under the Contract by a party other than the Contractor.
- B. The allowance is included in the Bid Form.
- C. The sum of an allowance is an estimated amount.
- D. The Contractor will be reimbursed only for the costs invoiced by the party providing the service, and no mark up, such as overhead and profit shall be charged by the Contractor.
- E. Services may be less than, equal to, or greater than, the estimated allowance amount. Contractor will be paid only the actual cost of the services.

1.04 ADJUSTMENT OF BONDS AND INSURANCE

- A. Adjustment to Contractor’s bonds and insurance on account of adjustment to allowance will only be dealt with in the final pay application considering the final cost of the project in comparison to the Bid Price.

1.05 SCHEDULE

- A. A Schedule of Allowances for this Contract is included at the end of this Section.

1.06 ENGINEER RESPONSIBILITIES

- A. Consult with Contractor in consideration of supplier of services.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Execute purchase agreement with designated supplier.

- B. For additional information, refer to specific specification sections referenced in Schedule of Allowances.

1.08 PAYMENT PROCEDURES

- A. Payment will be made under the Bid Item for the specified Allowance.
- B. Contractor submit invoices on a monthly basis with pay application.
- C. Pay application will not be accepted without invoices for allowance services performed during the pay application pay period.
- D. Pay invoice on approval of Engineer.

1.09 SCHEDULE OF ALLOWANCES

- A. Relocation of Underground Utilities: Allow the amount of \$ 3,000. For additional information, see Section 01 14 02 – Utility Obstructions and Bid Form.
- B. Testing Allowance: Allow the amount of \$ 5,000. For additional information, see Section 01 45 23 – Testing Laboratory Services and Bid Form.
- C. Pre-authorized Changes During Construction Allowance: Allow the amount of \$ 5,000. For additional information, see Standard General Conditions of the Construction Contract, Paragraph 10.01.C – Authorized Changes in the Work (as amended by Supplementary Conditions), Paragraph 11.02 C – Contingency Allowance, and the Bid Form. Changes to Work are governed under the Change Order provisions of the Contract Documents. If the cumulative price of Changes to Work total less than the Pre-authorized Changes During Construction Allowance, the Contract Price will be adjusted under Article 11 of the Standard General Conditions of the Construction Contract. For all Changes to Work in excess of the allowance amount, the Contract Price will be adjusted under Article 12 of the Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. For the purposes of this Specification Section, the terms “material and equipment” and “Products” have the same meaning and are used interchangeably.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract

1.03 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Contractor’s Options:

1. For Products specified only by reference standard, select any product meeting that standard.
2. For Products specified by naming several products or manufacturers, select any one of the products or manufacturers named, which complies with the specifications.
3. For Products specified by naming one or more Products or manufacturers and “or equal”, “or Engineer approved equivalent”, or “Engineer reviewed equivalent”, or similar term, Contractor shall submit a request as for substitutions for any Product or manufacturer not specifically named. The use of brand names is for the purpose of describing the standard of quality, performance and characteristics desired, and is not intended to limit or restrict competition.
4. For Products specified by naming only one Product and manufacturer, there is no option. This is usually done in cases where the Owner has standardized on previously purchased products and spare parts at its facilities, and needs to maintain consistent training, operation, and maintenance programs.

B. Substitutions:

1. For a period of 30 days after the Preconstruction Conference, Engineer will consider written requests from Contractor for substitution of Products.
2. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the Product specified.
 - e. Any required license fees or royalties.

- f. Availability of maintenance service, and source of replacement materials.
- 3. Engineer shall be the judge of the acceptability of the proposed Product substitution.

C. Contractor's Representation:

- 1. A request for a Product substitution constitutes a representation that Contractor:
 - a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the Product specified.
 - c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects. Upon request, submit to Engineer to-scale dimensioned electronic drawing files of the specific model of the requested substituted equipment items. Drawings shall show general arrangement plan and sections. Drawing files shall be in AutoCAD dwg format.
 - d. Waives all claims for additional costs or contract time, under his responsibility, which may subsequently become apparent.

- D. Engineer will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

1.04 INTENT OF TECHNICAL SPECIFICATIONS

- A. Since the specified materials and details of equipment and component fabrication and assembly are given for specific functional, operational, maintainability, and compatibility reasons, which are not detailed in the Contract Documents, any substitution shall provide the functional intent as well as the specified intent in all details, as determined by the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Measurement and Payment
- B. Schedule of Values
- C. Application for Payment

1.02 ADDITIONAL REQUIREMENTS

- A. Agreement and corresponding Bid.
- B. Conditions of the Contract: Progress payments and final payments.

1.03 MEASUREMENT AND PAYMENT

- A. Unit Price Items:
 - 1. Estimated Quantities:
 - a. Estimated quantities in Bid Form are approximate and used only for:
 - 1) Basis for estimating probable cost of Work.
 - 2) Comparison of Bids submitted for Work.
 - b. Actual Work done or materials furnished under Unit Price item may differ from estimated quantities.
 - c. Basis of payment: Actual amount of Work as determined by applying the appropriate Unit Price as Bid.
 - 2. Water Line
 - a. Unit Price per lineal foot for each item of Work to include all costs, unless otherwise specified.
 - b. Includes all trenching, backfilling, compaction, testing, and disinfection.
 - c. No payment for disinfection portion of the Work until successful submittal of Certification of Disinfection of Water Facilities as specified in Section 33 13 13.
 - d. Includes all fittings required for the Work, whether or not shown, except valves.
 - e. No extra payment for dewatering, rock excavation, select backfill, shoring, bracing or other attendant work, unless specifically provided in the Bid Schedule.

3. Trenching and Backfilling:
 - a. Unit Price Bid per lineal foot for each item of Work to include all costs, unless otherwise specified.
 - b. All Trenching Unclassified: The Bid Unit Price applies equally for any conditions encountered and any obstructions encountered for which separate Bid Items are not included in the Contract.
 - c. Depth of Trench: Height between existing ground surface and invert of pipe based on survey cut sheets.
 - d. No progress payments for lengths of trench that have not been backfilled as specified.
 - e. No extra payment will be made for dewatering, rock excavation, sheeting, shoring, bracing or other attendant work, unless specifically provided in the Bid Schedule.
 - f. No payment for trenching and backfilling until corresponding pipe in place is acceptable.
 - g. No extra payment will be made for minor delays as result of paleontological monitoring. This includes stopping of construction to investigate items within the trench. This is only required within the BLM area, station 10+00 to station 12+80. Expect & budget four hours of delay during the trenching operation.
4. Special Bedding or Encasement Where Specifically Indicated on Drawings.
 - a. Payment to include all Work and materials and is in addition to amount for trenching and backfilling and for pipeline.
5. Removal and Replacement:
 - a. When itemized in the Bid Schedule, payment to include all work and materials including removal, hauling and disposal, and replacement.
 - b. Pavement:
 - 1) Payment for trench pavement replacement to be to the limits specified in Section 32 09 00 – Removal and Replacement of Existing Surfaces, or as indicated on Drawings.
 - 2) Payment for pavement replacement required for water service line connections and water meter installations shall be incidental to each connection detail.
 - c. Sidewalks:
 - 1) There will be no additional payment for replacement of sidewalks unless itemized on Bid Schedule.
 - d. Gravel Surfaces: There will be no additional payment for replacement of gravel surfaces.
6. New Curb, Gutter, Sidewalks, and Drivepads:
 - a. Measurement for curb and gutter shall be by linear foot and shall be measured along the flow line of the gutter and next to the curb face. Deductions will be made for catch basins and inlet castings and no change in contract unit price will be made due to depressions for driveway accommodations. Driveway depressions will be located in the field by the Engineer after consultation with the property owners.

- b. Measurement for concrete curb and gutter, sidewalk, drivepads, and valley gutters shall be as called for on the bid form. Payment for curb and gutter, sidewalk, drivepads, and valley gutters shall be at the contract unit price per unit of measure called for on the bid form and such price and payment shall be in full compensation for furnishing all material, labor, equipment, and in performing all operations and incidentals necessary to complete the Work. The bid price shall include all pertinent Work, including subgrade preparation.
 - 7. Other Unit Price Items:
 - a. Unit complete in place and ready for use including all Work.
- B. Lump Sum Items: Payment for all lump sum bid items includes all Work, labor, and materials required to provide a complete ready to use installation.
- C. Materials:
- 1. Payment for materials delivered but not fully incorporated in project only made if such materials are included in the Schedule of Values and if such materials are available for inspection at Contractor's jobsite yard.
 - 2. For small projects for which a schedule of values is not required, payment for materials delivered but not fully incorporated in the project will only be made if such materials are available for inspection at Contractor's jobsite yard, and for which invoices are presented to Engineer.
 - 3. Payment for materials delivered but not fully incorporated into the project is only allowed if made without any Contractor markup or any other associated fees.
- D. Allowance Items: Contractor's actual costs for allowance items listed in Section 01 21 00 based on invoices received for actual time and materials expenses.
- E. Incidental Work:
- 1. All Work, labor, materials, appurtenances, activities, and requirements to complete the facilities complete in place and ready for use, and to comply with all requirements and conditions of the Contract Documents are considered incidental Work to the Contract Documents' bid items. No separate, additional or special payment will be due the Contractor for incidental Work.
 - 2. Above, on, or below ground obstructions, utilities, features or improvements which interfere with the Work or which must be moved, removed and/or restored to accomplish the Work are considered as incidental Work for which separate payment will not be made if separate bid items or allowances are not specifically given for such in the Contract Documents.
 - 3. Striping centerline shall be considered incidental to the paving and, therefore, no separate measurement or payment will be made unless there is a specific bid item for such.
 - 4. Field survey of existing roadway prior to removal of asphaltic paving.
 - 5. Traffic control work, signs, and devices unless otherwise specifically provided in the Bid Schedule.

6. New permanent traffic signing, if shown on Drawings, unless otherwise specifically provided in the Bid Schedule.
 7. Final adjustment of existing or new manhole rims, water valves, water meter lids, and fire hydrants to new finished grade, unless otherwise specifically provided in the Bid Schedule.
 8. Removal and/or replacement of sidewalk, curb and gutter, driveway pavement, medians, and gravel surface are considered incidental to work.
 9. Reclamation seeding.
 10. Pipe identification tape.
 11. Repair of existing water service lines of 1-inch and smaller.
 12. Repair of existing sewer service laterals of 4-inch and smaller.
 13. All clearing and disposal costs.
 14. Compliance with requirements of storm water discharge permit as specified by USEPA and as specified in these Contract Documents.
 15. Preparation of shop drawings prior to delivery of materials.
 16. Water bacteriological testing for disinfection of domestic water systems other than water wells.
- F. Operation and Maintenance Manual: For equipment requiring operation and maintenance manuals, no payment for installation of said equipment will be made to the Contractor until final operation and maintenance manuals have been submitted and accepted by the Engineer.
- G. Mobilization, Insurance and Bonds: Bid item amount is shown on the Bid Form.
- H. Demobilization and Submittal of All Closeout Documents: Bid item is shown on the Bid Form. Fifty percent of bid item will not be paid until Contractor has completed all closeout submittals to Engineer as specified in Section 01 77 00 – Contract Closeout.

1.04 SCHEDULE OF VALUES

- A. Requirements Included:
1. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within fifteen (15) days after start of Contract Time.
 2. Upon request of the Engineer, support the values with data which will substantiate their correctness.
 3. The Schedule of Values, unless objected to by the Engineer, shall be used only as the basis for the Contractor's Application for Payment.
- B. Form and Content of Schedule of Values:
1. Type schedule on 8-1/2 in. x 11 in. white paper; Contractor's standard forms and automated printout will be considered for approval by Engineer upon Contractor's request. Identify schedule with:
 - a. Title of Project and location.
 - b. Engineer and Project number.
 - c. Name and address of Contractor.

- d. Contract designation.
- e. Date of submission.
2. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall include all Work shown on Drawings and indicated in Specifications. Schedule shall be subdivided by categories with subtotals shown for each bid item listed in the Bid.
3. Follow the table of contents of this Project Manual as the format for listing component items.
 - a. Identify each line item with the number and title of the respective major section of the specifications.
 - b. List items paid via allowances separately from the rest of the Work and at the end of the Schedule.
4. For each major line-item list subvalues of major products or operations under the item.
5. Each of the various portions of the Work (excluding allowance items) listed in the Schedule of Values shall include a directly proportional amount of the Contractor's overhead and profit.
6. The unit values of the materials or equipment for which progress payments will be requested prior to installation and demonstration shall be broken down into:
 - a. Cost of the material or equipment delivered and unloaded at the site, with taxes paid.
 - b. Installation costs, including Contractor's overhead and profit.
 - c. Shakedown and demonstration of equipment and/or systems.
 - d. Operator training and/or manufacturer's inspection and/or certifications if required.
7. The unit quantity for bulk materials shall include an allowance for normal waste.
8. The sum of all values listed in the schedule shall equal the total amount of Contract.
9. No payment will be made exclusively for Contractor's preparation of submittals.

1.05 APPLICATIONS FOR PAYMENT

- A. Requirements Included:
 1. Submit Applications for Payment to Engineer in accordance with the schedule established by conditions of the Contract and Agreement between Owner and Contractor.
- B. Format and Data Required:
 1. Cover and signature page: As reviewed and approved by Engineer.
 2. Sheet size: 8.5" x 11" or 8.5" x 14".
 3. Payment items: Follow approved schedule of values.
 4. Preparation: Typed or machine printed.
 5. Columns Included:
 - a. Bid or payment item (from schedule of values)

- b. Unit
 - c. Contract:
 - 1) Contract or scheduled unit price
 - 2) Quantity
 - 3) Total price
 - d. Previously completed:
 - 1) Quantity
 - 2) Total price
 - e. Completed this period:
 - 1) Quantity
 - 2) Total price
 - f. Total to date:
 - 1) Quantity
 - 2) Total price
6. Contractor's standard format can be used if it meets these requirements or is approved by the Engineer.
 7. Submit draft payment applications electronically in Microsoft "EXCEL" spreadsheet format to Engineer for review. Include all supporting documents in e-mail to Engineer. Note: Payment applications in .pdf format for review purposes are not allowed.

C. Preparation of Application for Each Progress Payment:

1. Application Form:
 - a. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - b. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - c. Execute certification with signature of a responsible officer of Contract firm.
2. Continuation Sheets:
 - a. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
 - b. Fill in dollar value in each column for each scheduled line item when Work has been performed or products stored.
 - c. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
 - d. List by Change Order Number and description, as for an original component item of Work.
3. Limits of Payment for partially complete Water Line:
 - a. Not to exceed 80 percent of Unit Price for sections of line for which trench compaction tests and finish grading of the trench are complete but pressure testing has not been successfully completed.
 - b. Not to exceed 90 percent of Unit Price for sections of line for which disinfection has not been successfully completed.

D. Substantiating Data for Progress Payments:

1. Submit with each copy of application:

- a. Properly identified invoices supporting requests for materials payments.
- b. Properly identified invoices for inspection testing allowance payments.
- c. Labor standards certificate in accordance with example form to be provided by Engineer.
- d. If required by Engineer, certificate of payment of all suppliers and subcontractors for which payment has previously been received from Owner, in accordance with example form to be provided by Engineer.
- e. Copy of construction schedule showing progress to date.

E. Preparation of Application for Final Payment:

1. Fill in application form as specified for progress payments.
2. Provide certificate of payment of all suppliers and subcontractors.
3. Provide release of lien certificates from all subcontractors.

F. Submittal Procedure:

1. Review quantities and obtain concurrence of Engineer's field representative before submission.
2. Submit Applications for Payment to Engineer at the times stipulated in the Agreement.
3. Number: Seven (7) printed copies of each final, executed application, unless otherwise agreed to at the Pre-Construction Conference.
4. When Engineer finds Application properly completed and correct, he will transmit certificate for payment to Owner, with copy to Contractor.

PART 2 PRODUCT (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.01 MEETINGS

- A. Contractor to attend at no additional cost to Owner.
- B. Preconstruction conference to be scheduled by Engineer.
- C. Monthly progress meetings.
- D. Special meetings as deemed necessary and scheduled by Owner or Engineer.
- E. Special and final inspections by Owner or Engineer when requested.
- F. Contractor responsible for preparing progress meeting agenda and distribution of meeting notes at no additional cost to Owner.

1.02 SCHEDULE OF SPECIAL REQUIREMENTS FOR THIS PROJECT

- A. Special meeting to discuss the disinfection of water line and booster station.
 - 1. Disposal of chlorinated water.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 13

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Promptly after award of the Contract, prepare and submit to Engineer estimated initial baseline construction progress schedules for the Work.
- B. Submit revised progress schedules.
- C. Schedule subject to approval of Engineer.
- D. Schedule construction working hours.

1.02 FORM OF SCHEDULES

- A. Basis of Schedule: Critical path network analysis of construction activities.
- B. Format of Graphic Display of Schedule Submitted to Engineer:
 - 1. Gantt horizontal bar chart as a printed copy or in pdf electronic file format, as specified herein.
 - 2. Horizontal Time Scale: Identify the first work day of each week.
 - 3. Provide separate horizontal bar for each activity. In general, subdivide activities into sub-activities having durations no more than 15 working days, so that progress can be easily tracked.
 - 4. List the activities in chronological order according to the start date of each activity.
 - 5. Indicate durations and start/stop dates for each activity.
 - 6. Indicate the predecessor and successor activities for each activity.
 - 7. Identify which activities are on the critical path.

1.03 CONTENT OF SCHEDULES

- A. Activities: Show the complete sequence of construction by activity.
 - 1. Include activities for:
 - a. Preparation of submittals for major equipment items.
 - b. Procurement of major equipment items.
 - c. Mobilization.
 - d. Preparation of operation and maintenance manuals for major equipment items.
 - e. Shakedown/startup testing.
 - f. Punchlist work.
 - g. Preparation of closeout documents.

- h. Any sequence or scheduling constraints specified in Section 01 12 16 – Sequence of Work.

- B. Milestones: Indicate milestone dates for:
 - 1. Notice to Proceed.
 - 2. Notice of Substantial Completion.
 - 3. Final Completion.

1.04 PROGRESS REVISIONS

- A. Indicate effective date of revision and show progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - a. Revised projections of progress and completion.
 - b. Revised critical path activities.
 - c. Other identifiable changes.
- C. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the impact on the schedule.
 - 2. Corrective action to be taken.

1.05 SUBMISSIONS

- A. Submit initial baseline schedules within fifteen (15) days after start of Contract Time.
 - 1. Engineer will review schedules and return review comments within 10 days after receipt.
 - 2. If required, resubmit within 7 days after return of review copy.
- B. Submit updated schedules to show actual progress of Work with each application for payment: Section 01 29 00 – Payment Procedures.
- C. Submit revised progress schedules when requested by Engineer or whenever project is more than 5% behind approved schedule as determined by monthly request for payment.

1.06 DISTRIBUTION

- A. Distribute copies of the initial baseline and monthly updated schedules as follows:
 - 1. Engineer's Review Copy: One (1) printed copy or electronic file in .pdf format.
 - 2. Engineer's Record Copy: Four (4) printed copies.

1.07 CONSTRUCTION WORKING HOURS SCHEDULING

- A. Notify Engineer at least 48 hours in advance of any work to be done outside of usual working hours or any change in usual working hours.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop Drawings
- B. Product Data
- C. Samples
- D. Contractor Responsibility
- E. Engineer Responsibility
- F. Schedule of Submittals

1.02 RELATED WORK/REQUIREMENTS SPECIFIED ELSEWHERE

- A. Conditions of the Contract: Definitions and Additional Responsibilities of Parties

1.03 SHOP DRAWINGS

- A. Present drawings in a clear and thorough manner.
 - 1. Sufficient detail to show kind, size, and arrangement and function of component materials and devices.
- B. Minimum sheet size: 8-1/2" x 11".

1.04 PRODUCT DATA

- A. Preparation:
 - 1. Provide information required in individual Sections.
 - 2. Where sheets are reproduced from a pamphlet, catalog, or similar publication, print the manufacturer's name and the title of the publication on each sheet, or set of sheets, if it is not already on the sheet.
 - 3. Clearly mark each copy to identify applicable products or models by either neatly encircling pertinent data and marking the circle with an arrow or by crossing out all extraneous data, with black, indelible ink. Do not use highlighter because it will not reproduce well.
 - 4. For items that may be installed at multiple locations throughout the project, such as pipe materials, valves, other pipe appurtenances, and field coatings, indicate in a cover letter where each item is intended to be installed.
 - 5. Show performance characteristics and capacities.
 - 6. Show dimensions and clearances required.

7. Indicate weights of major components.
 8. Indicate materials of construction.
 9. Do not prepare submittal materials from facsimile (FAX) copies of product data unless specifically authorized by Engineer.
 10. Material described on Drawings but not shown in the Specifications: Provide cut sheets as a minimum, or as called for on the Drawings.
- B. Installation data for all materials and equipment for which operation and maintenance manuals will not be provided. Also provide installation data with shop drawing prior to delivery of equipment, if specified in the equipment Section.
1. Provide manufacturer's installation instructions and recommendations.
 2. Provide referenced standards for installation.
- C. Manufacturer's standard schematic drawings, diagrams, descriptions and information:
1. Modify to delete information that does not apply to Work.
 2. Supplement to provide information specifically applicable to the Work.

1.05 SAMPLES

- A. Samples shall be of sufficient size and quantity to clearly illustrate:
1. Functional characteristics of the project, with integrally related parts and attachment devices.
 2. Full range of color, texture, and pattern.
- B. Include identification on each sample, with full project information.

1.06 CONTRACTOR RESPONSIBILITIES

- A. If substitutions of materials are proposed, conform to Section 01 25 00 – Substitution Procedures.
- B. Submit exactly the required quantity of materials.
- C. Review Shop Drawings, Product Data, Certificates, Electrical Schematics, Electrical Connection Diagrams, Test Reports, Installation Instructions, Samples, and similar required submittal materials for completeness and accuracy prior to submission. Return unsatisfactory submittal materials to the supplier or manufacturer for correction.
- D. Determine and Verify:
1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and similar data.
 4. Conformance with Specifications.
 5. Conflicts with other items of construction past, present, or future.
 6. Submittal materials are legible.
- E. Coordinate each submittal with requirements of the Work and of the Contract Documents.

- F. Notify the Engineer in writing, at time of submission, of any deviations in submittal from Contract requirements.
- G. Begin no fabrication or work that requires submittals until return of submittals with Engineer's final review.

1.07 SUBMITTAL PROCEDURES

- A. Make submittals promptly and in such sequence as to cause no delay in the Work.
- B. Execute and attach "Contractor Submittal Form" to each submittal. Sample form is attached to the end of this Section. Sign, date, and forward the Form and the Contractor reviewed submittal materials to the Engineer.
- C. Number submittals by respective section number followed by an "S" for submittals, "P" for preliminary O&M, and "F" for final O&M.
- D. Include a copy of the respective Specification Section(s). For each paragraph of the Specifications, confirm that the submittal complies and include a tab and sheet number where the information can be found for each paragraph of the Specification. If the submittal does not comply with a paragraph, identify as such and provide an explanation why it does not. If this information is not provided with each submittal and preliminary O&M, then the Engineer will return as "Not Reviewed". Final O&Ms are excluded from this requirement.

1.08 RESUBMISSION REQUIREMENTS

- A. Make corrections/changes in the submittals to comply with comments made by the Engineer and resubmit until final review.
 - 1. Attach Engineer's comments from previous submittal annotated with action taken in the current submittal.
- B. Number resubmittals as identified in paragraph entitled "Submittal Procedures", and follow with a numeric value which identifies the number of resubmittals pertaining to that specific submittal.
- C. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
 - 2. Indicate any changes that have been made other than those requested by the Engineer.
- D. Samples: Submit new samples as required for initial submittal.
- E. Specifically direct attention in writing to revisions other than the corrections called for by the Engineer on previous submittals.
- F. Include a copy of previous "Contractor Submittal Forms".

- G. Include a copy of previous Engineer's comments, marked to show Contractor's responses. If not provided, submittal will be returned as "Rejected/Resubmit."
- H. Furnish all applicable information in the resubmittal, including information on material that was favorably reviewed. Upon request, the Engineer will return all but one of the original submittals for reuse by the Contractor.
- I. Partial resubmittals are allowed, but following favorable review of the partial resubmittal, provide complete resubmittals including all favorably reviewed material.

1.09 DISTRIBUTION

- A. Copy and distribute submittals returned by Engineer marked "No Exception Taken" or "Make Corrections Noted":
 - 1. Job site file.
 - 2. Job site record documents file.
 - 3. Subcontractors and suppliers as appropriate.
- B. If returned by Engineer, distribute samples marked "No Exception Taken" or "Make Corrections Noted" as directed by the Engineer.

1.10 ENGINEER RESPONSIBILITIES

- A. Review submittals with reasonable promptness as specified herein in the Timeliness subsection.
- B. Return submittals with completed Contractor Submittal Form with signature and attach review comments if needed.
- C. Return one copy of submittal to Contractor.
- D. Submittal Review Status Categories:
 - 1. "NO EXCEPTION TAKEN" – Reviewed for general conformity to the requirements of the Contract Documents. Quantities shown not verified. Contractor's full responsibility is in no way relieved by this action.
 - 2. "MAKE CORRECTIONS NOTED" – Reviewed and noted for general conformity to requirements of the Contract Documents. Quantities shown not verified. Contractor's responsibility is in no way relieved by this action. Resubmittal is not required, provided Contractor concurs with, accepts, and complies with A/E's comments.
 - 3. "REVISE & RESUBMIT" – Reviewed and not accepted. Provide missing information, make corrections as noted, and resubmit full submittal.
 - 4. "REJECTED/RESUBMIT" – Reviewed or partially reviewed and not accepted. Resubmit information in conformance with the Contract Documents.
 - 5. "RECEIPT ACKNOWLEDGED" – Submittal for Section is not required or submittal is being held by A/E for coordination of work with that of another Section.

- E. Return submittals with only cursory review and marked “Revise & Resubmit” or “Rejected/Resubmit” when:
 - 1. It becomes apparent the submittal is not acceptable,
 - 2. The submittal has not been thoroughly reviewed by the Contractor,
 - 3. Submittal does not cover all of a Section,
 - 4. Submittal improperly contains information for more than one Section, or
 - 5. Submittal is illegible.
- F. Return resubmittals only containing partial information.
- G. Discard submittal copies in excess of those scheduled.

1.11 LIMITS OF ENGINEER’S RESPONSIBILITY

- A. Engineer’s review does not constitute acceptance or responsibility for accuracy of dimensions or quantities.
- B. Engineer’s review does not relieve the Contractor from meeting requirements of the Contract Documents.
- C. Engineer’s review does not 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 by specific written notification for each such variation.
- D. Engineer’s review does not relieve the Contractor from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the Contractor’s Responsibilities portion of this Section.
- E. Engineer’s review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate approval of the assembly in which the item functions.

1.12 PAYMENT AND TIME FOR REVIEW OF EXCESSIVE SUBMITTALS

- A. Submittals after first resubmittal:
 - 1. Owner will charge Contractor for all of Engineer’s review time and costs at Engineer’s standard billing rates through a credit by Change Order.
 - 2. Reviewed by Engineer at convenience of the Engineer.

1.13 FORMAT

- A. Furnish individual submittal packages for each Section. Include a separate Contractor Submittal Form for each Section.

- B. The Contractor may elect to make a single submittal for all Sections supplied by a single manufacturer/supplier. Such single submittal must conform to the following:
1. Index the submittal with tabs with one and only one Section under a single tab.
 2. Include a separate Contractor Submittal Form for each Section.
 3. Identify submittal packages on the front or on the first page with the Owner's name, the project name, the Contractor's name, the subcontractor's name, the date, and the contents of the binder, including the Specification Section(s), title(s), and number(s).
- C. Minimum Acceptable Binding Methods:
1. Submittals of no more than six sheets per set, including cover sheets: Staple in sets.
 2. Submittals of seven to 25 sheets per set: Punch sheets and assemble in a soft-cover binder with 3-hole metal fold-down clips to hold pages or in a ring binder.
 3. Submittals of 26 to 75 sheets: Punch sheets and assemble in a hard-cover ring binder.
 4. Submittals of more than 75 sheets: Punch sheets and assemble in a hard-cover D-ring binder.
 5. Fold 11" x 17" drawings to fit into bound sets of submittals.
 6. Furnish drawings larger than 11" X 17" folded and inserted in pockets in the binders. Provide a complete index in the submittal literature set.

1.14 TIMELINESS

- A. As a minimum, the Contractor shall allow the following number of calendar days for submittal process:

| | <u>Engineer's Review Time</u> |
|-----------------------------------|-------------------------------|
| Initial Submittal | 14 |
| Resubmittal | 7 |
| Operation and Maintenance Manuals | 16 |

1. Engineer's Review Time is the time the submittal is in the Engineer's office.
 2. The Engineer will process first those items with higher priority based on a written request from the Contractor.
- B. Turnaround time for complex submittals (such as process equipment systems with multiple components, mechanical systems, electrical equipment, instrumentation control systems, and electrical process and instrumentation drawings) may exceed the total indicated in Paragraph 1.14A.
- C. Materials, equipment, supplies, or labor to install such materials or equipment for which submittals have not been marked "No Exception Taken" or "Make Corrections Noted" are not eligible for payment and such materials and equipment shall not be allowed on the job site.

1.15 PROJECT RECORD DOCUMENTS

- A. If the equipment installed deviates in any way from the submittal for the equipment, then submit copies of submittals that are corrected to show actual equipment supplied.

1.16 ATTACHMENTS TO THIS SECTION

- A. Contractor Submittal Form


1.17 REQUIRED SUBMITTALS

- A. Quantity, submit in **one** of the following formats:
 - 1. Electronic Format:
 - a. Submittals in electronic searchable .pdf format are allowed.
 - b. Engineer's submittal review will be returned to Contractor in electronic format.
 - c. After an electronic submittal is accepted by the Engineer as final, submit one printed copy to Engineer to retain for field use.
 - d. Any additional printed copies received will be discarded by Engineer.
 - e. Refer to Section 01 78 39 – Project Record Documents for submittal of one printed record set of submittals at Contract close-out.
 - 2. Or Printed Format:
 - a. For submittals in printed format only, submit five copies. Engineer will retain four copies.
 - b. Engineer will return one copy to Contractor.
 - c. Any additional copies received will be discarded by Engineer.
- B. See individual Specification Sections for description of required submittals.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

| # | CONTRACTOR SUBMITTAL FORM | |
|--|--|------------------------------------|
| Specification No. Title/Description: | Project: | Contractor's Submittal No.: |
| | CONTRACTOR: | Date: |
| | Subcontractor / Supplier: | Product Description: |
| | Specification No.: | Dates of any previous submissions: |
| | Are there any deviations to the Contract Documents? <input type="checkbox"/> No <input type="checkbox"/> Yes (Explain and Identify:) | Manufacturer: |
| | Drawing Nos.: | |
| <p> <i>Undisclosed deviations/modifications do not relieve the Contractor from the obligation to provide the specified product and detail of installation, and may be cause for rejection of the Work. Deviations and modifications must be listed here or in a separate Request for Substitution.</i> </p> | | |
| <p>CONTRACTOR'S CERTIFICATION: This submittal has been reviewed by the Contractor in compliance with Submittal Procedures of the CONTRACT DOCUMENTS' SPECIFICATIONS. Any deviations or substitutions to the CONTRACT DOCUMENTS have been identified above and submitted in compliance with the CONTRACT DOCUMENTS.</p> <p>If this is a re-submittal, identify on a sheet(s) attached to this form all responses to comments on the previous submittal and all changes other than those specifically requested by the A/E on the previous submittal.</p> | | |
| Signed _____ | | Date: _____ |
| A/E'S REVIEW RESPONSE <i>(Refer to Submittal Specification for explanation of categories.)</i> | | |
| Date Received: | No. Copies Received: | |
| <input type="checkbox"/> NO EXCEPTION TAKEN | | |
| <input type="checkbox"/> MAKE CORRECTIONS NOTED | | |
| <input type="checkbox"/> REVISE & RESUBMIT | | |
| <input type="checkbox"/> REJECTED/RESUBMIT | | |
| <input type="checkbox"/> RECEIPT ACKNOWLEDGED | | |
| By: | Date: | |
| Date Returned: | No. Copies Returned: | |
| A/E'S COMMENTS, IF ANY: | | |
| | | |
| A/E'S ATTACHMENTS, IF ANY: | | |
| | | |
| <p><i>Note: DO NOT combine items from different specification sections into one submittal unless called for in the Section. If provisions in the "General Conditions" conflict with this form, the provisions as stated in the "General Conditions" shall prevail.</i></p> | | |
|  <p>2701 Miles Road SE, Albuquerque, NM 87106</p> | | |

SECTION 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 SPECIAL

- A. A/E – Architect/Engineer.
- B. EPA – United States Environmental Protection Agency.
- C. NMAC – New Mexico Administrative Code.
- D. NMED – New Mexico Environment Department.
- E. NMSA – New Mexico Statutes Annotated.
- F. OSE – Office of State Engineer.
- G. OSHA – Occupational Safety and Health Administration.

1.02 OTHER

- A. As indicated on the Drawings, as apparent from the Drawings, or in accordance with standard practice.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Abbreviations and acronyms used in Contract Documents to identify reference standards.

1.02 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
- B. Publication Date: The publication in effect on the date of bid, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OF ORGANIZATIONS

- A. Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.

AA Aluminum Association
818 Connecticut Avenue, NW
Washington, D.C. 20006

AASHTO American Association of State Highway
and Transportation Officials
444 North Capital Street, NW
Washington, DC 20001

ABMA American Bearing Manufacturers Association
(formerly Anti-friction Bearing Manufacturers Association)
2025 M. Street, NW, Suite 800
Washington, DC 20036-3309

ACI American Concrete Institute
Box 19150
Reford Station
Detroit, MI 48219

| | |
|--------|--|
| ADAAG | Americans with Disabilities Accessibility Act Guidelines www.access-board.gov/adaag |
| ADC | Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601 |
| AGMA | American Gear Manufacturers Association 1001 N. Fairfax Street, Suite 500 Alexandria, VA 22314-1587 |
| AI | Asphalt Institute Asphalt Institute Building College Park, MD 20740 |
| AISC | American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020 |
| AISI | American Iron and Steel Institute 1000 16 Street, NW Washington, DC 20036 |
| ANSI | American National Standards Institute 1430 Broadway New York, NY 10018 |
| APWA | American Public Works Association 1313 E. 60 th Street Chicago, IL 60637 |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers 345 East 47 Street New York, NY 10017 |
| ASME | American Society of Mechanical Engineers 345 East 47 Street New York, NY 10017 |
| ASTM | American Society for Testing and Materials International 1916 Race Street Philadelphia, PA 19103 |

| | |
|------|---|
| AWI | Architectural Woodwork Institute 1411 S. Rimpau Avenue, Suite 213 Corona, CA 92879-7500 |
| AWWA | American Water Works Association 6666 W. Quincy Avenue Denver, CO 80235 |
| AWS | American Welding Society 2501 NW 7 Street Miami, FL 33125 |
| CBM | Certified Ballast Manufacturers 1422 Euclid Avenue Cleveland, OH 44115 |
| CPSC | Consumer Products Safety Commission www.cpsc.gov |
| CRSI | Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601 |
| CSA | Canadian Standards Association 178 Rexdale Boulevard Rexdale, Ontario, Canada M9W 1R3 |
| DHI | Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22102 |
| EEI | Edison Electric Institute 1111 19 Street, NW Washington, DC 20036 |
| ETL | Electrical Testing Laboratories 2319 Dorris Place Los Angeles, CA 90031 |
| FM | Factory Mutual www.fmglobal.com |

| | |
|------|--|
| FS | Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407 www.fss.gsa.gov/pub/fed-specs.cfm |
| GA | Gypsum Association 1603 Orrington Avenue Evanston, IL 60201 |
| HI | Hydraulic Institute 6 Campus Drive, First Floor North Parsippany, NJ 07054-4405 |
| IBC | International Building Code published by International Code Council 500 New Jersey Avenue, NW, 6 th floor Washington, DC 20001 |
| ICEA | Insulated Cable Engineers Association P.O. Box P South Yarmouth, MA 02664 |
| IEEE | Institute of Electrical and Electronics Engineers 345 East 47 Street New York, NY 10017 |
| ISA | Instrument Society of America 67 Alexander Drive P.O. Box 12277 Research Triangle Park, NC 27709 |
| MIL | Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120 |
| NACE | National Association of Corrosion Engineers P.O. Box 21830 Houston, TX 77218 |

| | |
|-------|--|
| NEC | National Electric Code Batterymarch Park P.O. Box 9101 Quincy, MA 02269 |
| NEMA | National Electrical Manufacturers' Association 2101 L Street, NW Washington, DC 20037 |
| NESC | National Electric Safety Code 345 East 47 Street New York, NY 10017 |
| NFPA | National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210 |
| NFPA | National Forest Products Association 1619 Massachusetts Avenue, NW Washington, DC 30036 |
| NMBC | New Mexico Building Code Code Regulations Licensing Department Construction Industries Divisions 725 St. Michaels Drive Santa Fe, NM 87504 |
| NRCA | National Roofing Contractors Association www.nrca.net |
| NSF | National Sanitation Foundation International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48105 |
| NWWDA | National Wood Window and Door Association P.O. Box 34518 Memphis, TN 38184 |
| OSHA | Occupational Safety & Health Administration www.osha.gov |
| PCA | Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076 |
| PCI | Prestressed Concrete Institute |

20 North Wacker Drive
Chicago, IL 60606

- SDI Steel Door Institute
712 Lakewood Center North
Cleveland, OH 44107
- SIGMA Sealed Insulating Glass Manufacturer's Association
111 East Wacker Drive
Chicago, IL 60601
- SJI Steel Joist Institute
1703 Parham Road
Suite 204
Richmond, VA 23229
- SMACNA Sheet Metal and Air Conditioning
Contractors' National Association, Inc.
8224 Old Court House Road
Vienna, VA 22180
- SSPC The Society for Protective Coatings (formerly Steel Structure
Painting Council)
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656
(877) 281-7772
- UBC Uniform Building Code
International Conference of Building Officials
5360 Workman Mill Road
Whittier, CA 90601-2298
- UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062
- UPC Uniform Plumbing Code
International Association of Plumbing/Mechanical Officials
20001 Walnut Drive, South
Walnut, CA 91789-2825

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 16.14

DIGITAL VIDEO RECORDING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Digital video record entire area affected by construction prior to construction.
- B. Perform additional digital video recording during project as directed by Engineer.
- C. Have digital video files available with viewing facilities for viewing by Engineer, Owner, and Contractor when requested.
- D. Digital video recording requirement part of Contractor's general overhead for which separate payment shall not be made.

1.02 EQUIPMENT REQUIREMENTS

- A. Digital Video Camera Equipment:
 - 1. Recording Media: DVD.
 - 2. Format: Digital files compatible with standard playback equipment, and as agreed upon beforehand with Owner.
 - 3. Color picture.
 - 4. Audio, clear narration in English of significant features observed during recording.
 - 5. Zoom lens.
 - 6. Indexing of locations on discs for easy reference.
 - 7. File downloading capability: To a personal computer (PC) that operates on Microsoft operating system of Windows XP or higher.
- B. Video Viewing System:
 - 1. Screen: 26 inches (diagonal dimension) or greater.
 - 2. Color picture.
 - 3. Audio.
 - 4. Indexing of locations on discs for easy reference.
 - 5. Slow motion.
 - 6. Stop frame for viewing single picture.
 - 7. Reversing.
 - 8. Compatible with digital recording equipment.
- C. Discs:
 - 1. Catalogued, cross-referenced, indexed.

1.03 SYSTEM OPERATOR REQUIREMENTS

- A. Familiar and experienced with equipment and equipment operations.

1.04 AVAILABILITY

- A. Recording equipment and operator available on-site within 0.5 hours of Engineer's request during Contractor's normal working hours if scheduled.
- B. Viewing system and appropriate discs available at meetings as scheduled or when requested by Engineer.
- C. Deliver one (1) complete set of files to the Owner upon acceptance by the Engineer.

1.05 DIGITAL VIDEO RECORDING REQUIRED IF SCHEDULED

- A. All streets, alleys, curbs, culverts, vaults, manholes, areas, locations where construction will be done:
 - 1. Both directions along utility line or street to be constructed or reconstructed.
 - 2. Maximum speed of camera movement 4 feet per second.
 - 3. Lateral and close-up view of any features or facilities that may be affected by construction.
 - 4. Not more than 14 calendar days prior to actual construction.
 - 5. Include data documentation on disc.
 - 6. Audio explanation of significant features observed during recording.
 - 7. Recording results acceptable to Engineer.
 - 8. Special documentation to include the area to be demolished.
- B. Drainage Documentation:
 - 1. Following general rainfall over area.
 - 2. Prior to any construction if practical.
 - 3. All areas where work will be performed.
 - 4. Recorded to document general preconstruction drainage patterns, problems, street surface conditions, and related items.
 - 5. On request of Engineer.

1.06 SCHEDULE OF REQUIRED DIGITAL VIDEO RECORDING

- A. Provide digital video recording as outlined in Part 1.05 A.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 23

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Employ and pay for the services of an independent testing laboratory to perform specified services and testing associated with soil gradation and density, concrete, and asphalt.
- B. If the work includes bacteriological testing of water associated with disinfection, refer to Section 33 13 13 – Disinfection of Domestic Water Systems, for certification of the water test laboratory and payment procedures for bacteriological testing.
- C. If the Work includes a water well, refer to Section 33 21 00 – Water Well, for certification of the water test laboratory and payment procedures for bacteriological and water quality testing.

1.02 ADDITIONAL REQUIREMENTS

- A. Conditions of the Contract: Testing required by laws, ordinances, rules, regulations, orders or approval of public authorities.
- B. Each specification section listed: Laboratory tests required and standards for testing.

1.03 SUBMITTALS

- A. Submit for Engineer's review the name of proposed Laboratory to perform required testing and their statement of qualifications.
 - 1. Name(s) of professional engineer(s) registered in the state in which the project is located who will be signing test results.
 - 2. Qualifications of technicians and their certifications, such as NICET (National Institute for Certification in Engineering Technologies), to perform testing required for this project as specified in ASTM E329.
 - 3. Evidence of current participation in the AASHTO Materials Reference Laboratory (AMRL) program, and accreditation of the laboratory and list of test methods currently accredited by the AASHTO Accreditation Program (AAP).

1.04 QUALIFICATION OF LABORATORY

- A. Meet basic requirements of ASTM E329, "Standard Specification Agencies Engaged in Testing and/or Inspection of Materials Used in Construction".
- B. Authorized to operate in the State in which the Project is located by the local governing authority for the AASHTO Accreditation Program.

- C. Testing Equipment:
 - 1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Institute of Standards and Technology (NIST) (formerly National Bureau of Standards).
 - b. Accepted values of natural physical constants.
- D. Office Location: The location at which specified services and testing will be performed or from which Testing Laboratory staff will mobilize to perform field work shall be within 50 miles of the project site.

1.05 LABORATORY DUTIES

- A. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test; one copy to Engineer, one copy to Structural Engineer, and copies as required to Contractor. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory number, address, and telephone number.
 - 4. Name and signature of laboratory technician.
 - 5. Date and time of sampling or field testing.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in the Project.
 - 10. Type of test.
 - 11. Results of tests and compliance with Contract Documents.
 - 12. Interpretation of test results when requested by Engineer.
- E. Perform additional tests as required by Engineer or the Owner.
- F. In all cases, the Engineer shall determine the number, type and location of tests.
- G. Provide signature and seal of a Professional Engineer, licensed in the State where work is being performed, and who is employed by the Laboratory on all test results.

1.06 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.

2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.

1.07 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to Work, and manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete and other material mixes which require control by the testing laboratory.
- D. Furnish copies of Product test reports as required.
- E. Furnish Incidental Labor and Facilities:
 1. To provide access to Work to be tested.
 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 3. To facilitate tests.
 4. For storage and curing of test samples.
- F. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience and retests required for previously failed tests.
- G. Notify testing laboratory at least 48-hours in advance of all testing required by job progress or conditions, or the Engineer.
- H. Provide on-site facilities as required for initial curing of concrete cylinders.

1.08 PAYMENT

- A. An allowance is included in the Bid Proposal to cover field testing performed by an independent testing laboratory. In accordance with Section 01 21 00 - Allowances, the Owner will reimburse the Contractor for the actual cost of all such testing based on invoices received from the laboratory.
- B. The invoiced cost of mileage for all vehicles used shall be no greater than the standard mileage rate for business miles in effect at the times of occurrence, as published by the Internal Revenue Service (IRS).
- C. The testing allowance stated in the Bid Proposal is an estimated dollar amount. The final dollar amount reimbursed to the Contractor for testing may be less than, equal to, or more than the stated allowance.
- D. Actual reasonable sample shipping costs will be paid to the Contractor in the same manner and under the testing allowance.

E. Costs for testing described in Paragraph 1.07.F are not eligible for reimbursement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 51 00

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 WATER

- A. Water required for construction may be drawn from Owner's water system, at the commercial rate.
- B. Contractor is not allowed to sell water to other users.

1.02 ELECTRICITY

- A. Contractor is responsible for all costs associated with providing temporary power to the construction areas to accomplish the Work.

1.03 OTHER

- A. All other temporary utilities required to accomplish the Work to be the responsibility of and at the Contractor's sole expense.

1.04 SPECIAL PROJECT REQUIREMENTS SCHEDULE

- A. Provide sanitary facilities for Contractor's personnel.

1.05 CONNECTION REQUIREMENTS

- A. Install temporary backflow preventer at hydrant source or point of connection.
- B. Install temporary flowmeter at fire hydrant source or point of connection.
- C. If loading water into a water truck, provide an air gap of twice the diameter of the fill pipe between the fill pipe the top of the tank inlet port.
- D. Provide at no additional cost to Owner.

1.06 WATER USE CHARGES

- A. Water used for construction is provided by the Owner at commercial rates charge to the Contractor.
- B. Contractor is required to submit monthly flow meter readings to Owner's representative.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 55 00

TRAFFIC REGULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices as required to expedite public vehicular traffic flow and access on haul routes, at site entrances, on-site access road, parking areas, and any areas affected by construction operations.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 RELATED REQUIREMENTS

- A. Section 01 14 16.01 – Coordination with Public and Utility Interruptions
- B. Section 01 56 00 – Barriers

1.03 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples
 - 1. Qualifications of person who prepares the Traffic Control Plan (TCP).
 - 2. Submit Traffic Control Plan to Engineer.

1.04 TRAFFIC CONTROL SIGNALS AND SIGNS

- A. Submit proposed Traffic Control Plan prior to implementation:
 - 1. Full conformance with the Department of Transportation “Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD),” latest edition.
 - 2. TCP shall be prepared by a person possessing one of the following current certifications:
 - a. Traffic Control Supervisor (TCS) certified by the American Traffic Safety Services Association (ATSSA).
 - b. Design and operation of Work Zone Traffic Control course credits offered by the National Highway Institute.
 - c. Work Zone Temporary Traffic Control Technician certified by the International Municipal Signal Association (IMSA).
 - 3. The person who prepares the TCP shall visit the project site prior to preparing the TCP.

- B. Provide traffic control and directional signs for all closures and detours, mounted on barricades or standard posts with warning flashing lights. Any deviation from “MUTCD” requires prior approval of Engineer.

1.05 CONSTRUCTION PARKING CONTROL

- A. Control Contractor’s and construction personnel’s private vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles or Owner’s operations.

1.06 SPECIAL REQUIREMENTS FOR THIS PROJECT

- A. Provide traffic and detour controls and signs as required on Drawings and as necessary to meet the requirements of this Section, Section 01 14 16.01 – Coordination with Public and Utility Interruptions.
- B. The Contractor shall have a responsible person on site during working hours and on call during non-working hours to inspect and maintain project traffic control.
- C. All non-applicable signing shall be removed or covered completely with an opaque non-light transmitting material. All remaining, non-applicable traffic control devices are to be removed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 56 00

BARRIERS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install, and maintain suitable barriers as required to prevent public entry, and to protect the public, Work, and existing facilities; remove when no longer needed or at completion of Work.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 BARRIERS

- A. Materials to Contractor's option, as appropriate to serve required purpose.

PART 3 EXECUTION

3.01 GENERAL

- A. Install facilities of a neat and reasonable uniform appearance, structurally adequate for required purposes.
- B. Maintain barrier during entire construction period.
- C. Relocate barriers as required by progress of construction.
- D. Provide barriers to protect the public from excavations and hazardous conditions and operations.
- E. If a trench or excavation, where accessible to the public, is left open at night or weekends, it must be barricaded with flashing lights.

3.02 FENCES

- A. Fence Location:
 - 1. Locate fence to enclose substantially entire Project site or that portion the Contractor establishes as required to encompass entire Project construction operation.
 - 2. Locate vehicular entrance gates in suitable relation to construction facilities; and to avoid interference with traffic on public thoroughfares.

- B. Chainlink Fence:
 - 1. Fence not generally required for sewer lines, waterlines, and street work.
 - 2. Fence generally required for treatment plant, pump stations, and similar facilities.

3.03 REMOVAL

- A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed.
- B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of Work.

1.02 NOISE CONTROL

- A. Limit to practical extent.
- B. Limit to normal working hours when practical.

1.03 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent airborne dust from dispersing into the atmosphere.

1.04 WATER CONTROL

- A. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
 - 1. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff.
- B. Provide, operate and maintain hydraulic equipment of adequate capacity to control surface water.
- C. Dispose of drainage water and dewatering water in a manner to prevent flooding, erosion or other damage to any portion of the site or to adjoining areas. Any public agency or private landowner arrangements, permits, or other approvals required for the discharge of water are the sole responsibility of the Contractor.

1.05 PEST CONTROL

- A. As found necessary during construction.

1.06 RODENT CONTROL

- A. Provide rodent control as necessary to prevent infestation of construction or storage

area.

1. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.
2. Should the use of rodenticides be considered necessary, submit an informational copy of the proposed program to Owner with a copy to Engineer. Clearly indicate:
 - a. The area or areas to be treated.
 - b. The rodenticides to be used, with a copy of the manufacturer's printed instructions.
 - c. The pollution preventive measures to be employed.

- B. The use of any rodenticide shall be in full accordance with the manufacturer's printed instructions and recommendations and applicable laws and regulations.

1.07 DEBRIS CONTROL

- A. Maintain all areas under Contractor's control free of extraneous debris.
- B. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
 1. Provide containers for deposit of debris as specified in Section 01 74 00 – Cleaning and Waste Management.
 2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
 - a. Provide periodic inspection of traffic areas to enforce requirements.
- C. Schedule periodic collection and disposal of debris as specified in Section 01 74 00 – Cleaning and Waste Management.
 1. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.

1.08 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent the discharge of hazardous substances from construction operations.
- B. Perform emergency measures required to report, contain and transport harmful substance discharges or spills by complying with Federal and State regulations.
- C. Take special measures to prevent harmful substances from entering public waters.
 1. Prevent disposal of wastes, effluents, chemicals or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
 1. Prevent toxic concentrations of chemicals.
 2. Prevent harmful dispersal of pollutants into the atmosphere.

1.09 EROSION CONTROL

- A. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Hold the areas of bare soil exposed at one time to a minimum.
 - 2. Provide temporary control measures such as berms, dikes, drains, straw bales, silt fences, and wattles.
- B. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
- C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

1.10 SECURITY CONTROL

- A. Provide temporary padlocks during construction on gates, hatches, doors, panels, and boxes having hasps. Coordinate with Owner to install specified permanent padlocks at completion of project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and Pay for Field Engineering Services Required for Project:
 - 1. Survey work required in execution of Project.
 - 2. Engineering work for civil, structural or other professional engineering services specified or required to execute Contractor's construction methods.

1.02 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. Survey work during construction may be completed by the Contractor. However, all locations/elevations must be verified at the completion of the contract by a qualified land surveyor registered in the state in which the construction is being done. Final survey data shall be documented on the Record Drawings.
- B. Engineering work by qualified professional engineer registered in the state in which the construction is being done.

1.03 SURVEY REFERENCE POINTS

- A. Original basic horizontal and vertical control points for the Project are those designated on Drawings.
- B. Locate existing control points, re-establish original control points, protect control points prior to starting site work, and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to Engineer.
 - 2. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to replace Project control points which may be lost or destroyed.
 - 4. Establish replacements based on original survey control.
- C. Reconfirm all existing and original vertical elevation control points prior to the use of such points for project surveying. Reference control point for such reconfirmation is shown on Drawings.
- D. Refer any apparent discrepancies to Engineer for resolution. Surveyor to assist Engineer with field work required for resolution of such apparent discrepancies.

1.04 PROJECT SURVEY REQUIREMENTS

- A. Establish lines and levels, locate and lay out, by instrumentation and similar

appropriate means:

1. Site improvements:
 2. Stakes for grading, fill and topsoil placement.
 3. Utility slopes and invert elevations.
 4. Batter boards for structures.
 5. Building foundation, column locations, and floor levels.
 6. Controlling lines and levels required for mechanical and electrical trades.
- B. From time to time, verify layouts by same methods as required for control of the Work and when requested by the Engineer.
- C. The Contractor shall take reasonable efforts to protect all existing property corners, permanent bench marks, right-of-way markers, government established monuments, and similar reference points. If any must be disturbed, the monuments must be referenced before removal and replaced as soon as work in the area is completed. Referencing and replacing shall be done by a licensed surveyor, and in the case of U.S.G.S. monuments and NMDOT right-of-way markers, shall be a first order survey work.

1.05 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. On completion of improvements, prepare record drawings showing all dimensions, locations, and elevations of construction.

1.06 SUBMITTALS

- A. Submit name and address of surveyor and professional engineer to Engineer.
- B. Submit documents certifying current registration of surveyor and engineer.
- C. On request of Engineer, submit documentation to verify accuracy of field engineering work.
- D. Survey data and computations for all Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract
- B. Each Specification Section: Cleaning for specific products or work.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING SCHEDULE

- A. Type 1 – For Buildings:
 - 1. Employ skilled workmen for final cleaning.
 - 2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
 - 3. Wash and shine glazing and mirrors.
 - 4. Polish glossy surfaces to a clear shine.
 - 5. Ventilating Systems:
 - a. Clean permanent filters and replace disposable filters if units were operated during construction.
 - b. Clean ducts, blowers and coils if units were operated without filters during construction.
 - 6. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
 - 7. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire Work is clean.
- B. Type 2 – For Grounds and Exposed Concrete Work:
 - 1. Broom clean exterior paved surfaces; rake clean other ground surfaces.
 - 2. Broom clean all concrete slabs.
 - 3. Remove grease, mastic, adhesives, dust, dirt, stains, labels and other foreign materials from all piping systems surfaces and equipment.
 - 4. Prior to final completion or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire Work is clean.

END OF SECTION

SECTION 01 74 17

STORM DRAINAGE DISCHARGE COMPLIANCE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Prepare a Storm Water Pollution Prevention Plan (SWPPP) to control storm water discharges from construction activities during the Project that disturb one or more acres, and comply with all other requirements of the USEPA-NPDES Program.
- B. Scope of Work:
1. Work includes compliance with the U.S. Environmental Protection Agency (EPA), National Pollution Discharge Elimination System (NPDES) Regulations for Storm Water Discharges from construction sites, per 40 CFR, Parts 122, 123, and 124. Additional information on the EPA Construction General Permit (CGP) and SWPPP for construction activities can be found at:
https://www.epa.gov/sites/production/files/2017-06/documents/2017_cgp_final_permit_508.pdf
<https://www.epa.gov/npdes/2017-construction-general-permit-cgp>
 2. Develop and submit a site-specific SWPPP prior to commencement of construction, and implement and maintain Best Management Practices (BMPs) identified in this plan to control erosion, pollution, sediment, and runoff during the construction of the Project. Storm water pollution prevention practices shall meet the current standards of the industry and all of the requirements of the current CGP. Contractor is encouraged to use the SWPPP template and reporting forms provided at the referenced web site.
 3. Contractor shall determine and identify in the SWPPP if the Project is in an Arid or Semi-Arid area as defined in Appendix A – Definitions and Acronyms, of the CGP.
 4. If the disturbed area is less than five acres, the Project duration is short and avoids the wet season, and the erosivity index (R factor) for the site is low, Contractor may apply for a Low Erosivity Waiver (LEW) Certification. The LEW calculation procedures and Certification Form are found on the referenced EPA websites. Contractor may use the calculation tool on the following EPA website to determine whether or not the site is eligible for a LEW.
<https://www.epa.gov/npdes/rainfall-erosivity-factor-calculator-small-construction-sites>
If the site is eligible for a LEW and Contractor properly submits the LEW Certification Form, Contractor is exempt from the requirements to prepare a SWPPP. Although the Contractor is not required to prepare a formal SWPPP document, it shall still be responsible for general good housekeeping of the site such as track-out prevention, concrete washout, erosion control, litter control, and any other appropriate efforts.

5. Contractor shall conduct site inspections, monitoring, and testing as required in the CGP and complete reports within the time required.
 6. Contractor shall maintain and update the SWPPP as necessary and required by the CGP.
 7. Contractor shall have the SWPPP available for review at all times.
 8. Contractor shall remove non-permanent BMPs at completion of the Project.
 9. All work specified in this Specification Section shall be provided by Contractor under the bid item listed in the Bid Form or, if no bid item is listed, shall be provided as incidental work at no additional cost to Owner.
- C. Compliance with Storm Drainage Discharge Requirements:
1. Contractor shall meet all requirements of the most current version of the NPDES General Permit for Discharge from Construction Activities (CGP).
 2. Contractor shall file a Notice of Intent (NOI) at least 14 days prior to commencing earth-disturbing activities and is required to use EPA's electronic NOI system or "eNOI system" to prepare and submit the NOI. In addition to submitting the Contractor's NOI, the Contractor shall assist the Owner in a timely fashion with the preparation and submittal of the NOI that is required to be submitted by the Owner.
 3. Contractor shall file a Notice of Termination (NOT) and is required to use EPA's electronic NOI system or "eNOI system" to prepare and submit the NOT. In addition to submitting the Contractor's NOT, the Contractor shall assist the Owner with the preparation and submittal of the NOT that is required to be submitted by the Owner.
 4. Owner will assist Contractor with the necessary information for preparation and certification of its subsequent NOI and NOT.
- D. Contractor shall also submit one (1) copy of the completed SWPPP to Owner at the time Contractor submits his NOI.
- E. By completing the NOI, Contractor is certifying to Owner that a SWPPP has been completed in conformance with the CGP Permit and is in Contractor's possession.
- F. Contractor is the designated "Operator" of the Permit and is solely responsible for execution of the Project construction in conformance with CGP Permit condition(s) and requirement(s), including work performed by any subcontractor(s). Contractor shall immediately correct conditions related to the Project that are in violation of Permit requirements. Failure by Contractor to correct such conditions in a timely manner may subject Contractor to fines and/or penalties.
- G. Contractor shall indemnify, defend, and hold Owner and its Representative(s) harmless from any fines and/or penalties issued for violations of Permit conditions.
- H. In the event Contractor fails to comply with NPDES Permit requirements, Owner retains the right to enter upon the Project site and perform corrective measures. Any costs associated with corrective measures shall be the responsibility of, and shall be paid by, Contractor. Owner shall be entitled to deduct such costs from remaining

Contract Amounts, and if insufficient Contract Amounts exist, Contractor shall reimburse Owner for any deficiency.

- I. If payment for the SWPPP is listed as a bid item in the Bid Form, payment shall be made in increments equal to the percent complete on the overall Project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 75 01

FIELD SERVICE REPRESENTATIVE

PART 1 GENERAL

1.01 FIELD SERVICE REPRESENTATIVE

- A. Shall be employed by the manufacturer and shall regularly engage in field checkout, calibration, testing, trouble-shooting, installation supervision, and start-up of equipment or systems.
- B. Shall have qualifications and experience acceptable to the Owner and the Engineer. Submit name and qualifications of Field Service Representative with the shop drawing submittal of the applicable equipment item.
- C. A manufacturer's sales representative will not be acceptable as a field service representative unless the Contractor applies for and receives in writing a waiver for such from the Owner.
- D. Shall be thoroughly familiar with the specific equipment or system for this project on arrival at the jobsite. The Field Service Representative shall perform installation supervision, field check-out, calibration, testing, troubleshooting, adjustment or other services as specified in the pertinent section.
- E. The Engineer reserves the right to require a substitute Field Service Representative, at no extra cost to the Owner, if the Field Service Representative supplied by the manufacturer is not able to properly perform the required tasks.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TEST EQUIPMENT

- A. Coordinate requirements for test equipment with Field Service Representative and ensure that all necessary standard and special test, calibration, and diagnostic equipment is available for start-up testing.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract. Fiscal provisions, legal submittals and additional administrative requirements.
- B. Section 01 29 00 – Payment Procedures
- C. Section 01 33 23 – Shop Drawings, Product Data, and Samples
- D. Section 01 78 23 – Operation and Maintenance Data

1.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, Contractor shall submit to Engineer:
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, Engineer will make an inspection to determine the status of completion. If acceptable to Engineer and Owner, Engineer will notify Contractor in writing. Work is substantially complete when:
 - 1. All systems are complete and functional.
 - 2. All final Operation and Maintenance Manuals have been accepted.
 - 3. Any required shakedown testing periods have been completed.
 - 4. Utilities, alarms, electrical, area lighting, monitoring, controls, drains, piping, paving, and related components are in place and completed.
 - 5. Facilities can be put to intended use.
 - 6. Owner is able to use for intended use at no additional cost to Owner.
- C. Should Engineer determine that the Work is not substantially complete:
 - 1. Engineer will promptly notify the Contractor in writing, giving the reasons therefor.
 - 2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer.
 - 3. Engineer will reinspect the Work.

4. Owner may charge Contractor for all of Engineer's reinspection time and costs at Engineer's standard billing rates through a credit by Change Order.
- D. Contractor's warranty start date for equipment systems will be the date of Substantial Completion accepted by the Engineer/Owner for that specified equipment system.
- E. After the Engineer and Owner have accepted the Work, or designated portion thereof, Owner will assume responsibility for operation and maintenance of the facilities and equipment, or designated portion thereof.

1.04 FINAL INSPECTION

- A. When Contractor considers the Work is complete, Contractor shall submit written certification 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 Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 5. Work is completed and ready for final inspection.
- B. Engineer will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Engineer consider that the Work is incomplete or defective:
 1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Engineer that the Work is complete.
 3. Engineer will reinspect the Work.
- D. When the Engineer finds that the Work is acceptable under the Contract Documents, Engineer will request the Contractor to provide closeout submittals as listed in subsection 1.06.

1.05 REINSPECTION FEES

- A. Should Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
 1. Owner will compensate Engineer for such additional services.
 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Evidence of compliance with requirements of governing authorities.
- B. Warranties and Bonds: To requirements of General Conditions.

- C. Evidence of Payment and Release of Liens: To requirements of General and Supplemental Conditions.
- D. Consent of Surety: To requirements of General Conditions.
- E. Project Record Documents: To requirements of Section 01 78 39.
- F. Operating and Maintenance Data: To requirements of Section 01 78 23.
- G. Instructions to Owner's Personnel: To requirements of Section 01 79 01.
- H. Spare Parts and Maintenance Materials: To requirements of Section 01 78 44.
- I. Notarized affidavit confirming successful completion of disinfection of the system: To requirements of Section 33 13 13.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Engineer.
- B. Statement shall reflect all adjustments to the Contract Sum:
 - 1. The original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices
 - d. Deductions from uncorrected Work
 - e. Deductions for liquidated damages
 - f. Deductions for reinspection payments
 - g. Other adjustments
 - 3. Total Contract Sum, as adjusted
 - 4. Previous payments
 - 5. Sum remaining due
- C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.08 FINAL APPLICATION FOR PAYMENT

- A. After receiving written notification from the Engineer that Contractor has completed all requirements specified in subsections 1.03, 1.04, 1.06, and 1.07, Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Contract Documents.
- B. Contractor shall provide the consent of surety to final payment when submitting the application for final payment.
- C. Contractor shall provide all other documents specified in Supplementary Conditions SC-14.07.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Format and Content of Manuals
- B. Submittal of Manuals
- C. Schedule of Submittals

1.02 RELATED WORK

- A. Section 01 29 00 – Payment Procedures
- B. Section 01 77 00 – Contract Closeout
- C. Section 01 79 01 – Manufacturer’s Instruction of Owner’s Personnel

1.03 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of the described products.
 - 2. Completely familiar with requirements of this Section.
 - 3. Skilled as a technical writer to the extent required to communicate essential data.
 - 4. Skilled as a draftsman competent to prepare required drawings.
- B. Manuals for equipment and systems shall be prepared by the equipment manufacturer or system supplier.

1.04 FORMAT

- A. Prepare data in the form of an instructional manual for use by Owner’s personnel.
 - 1. Binders:
 - a. Preliminary manuals: Heavy paper covers.
 - b. Final manuals: Commercial quality substantial, permanent, 3-ring or 3-post binders with durable, cleanable plastic covers. Covers of adequate size to easily contain required information.
- B. Cover and Spine: Identify each volume with typed or printed title “OPERATING AND MAINTENANCE INSTRUCTIONS”. List:
 - 1. Title of Project.
 - 2. Identity of separate structure as applicable.

3. Identity of general subject matter covered in manual.
- C. Assemble and bind material in the same order as specified in Paragraph 1.06 with the material grouped in the same manner as the applicable portions of the CONTRACT DOCUMENTS.
 - D. Text: Manufacturer's printed data, or typewritten data on 20 lb. minimum, white, paper. Size: 8-1/2 x 11.
 - E. Drawings:
 1. Provide reinforced punched binder tab, bind in with text.
 2. Reduced to 8-1/2" x 11" or 11" x 17" and folded to 8-1/2" x 11".
 3. Where reduction is impractical, folded and placed in 8-1/2" x 11" envelopes bound in text.
 4. Suitably identified on drawings and envelopes.
 - F. Provide binder tab for each separate product, or each piece of operating equipment.
 1. Provide typed description of product, and major component parts of equipment.
 2. Provide indexed tabs corresponding to items listed in the table of contents.

1.05 CONTENT OF MANUALS

- A. Table of Contents:
 1. Provide title of project.
 2. Contractor, name of responsible principal, address and telephone number.
 3. Schedule of products and systems, indexed to the content of the volume.
 4. List, with each product, the name, address and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance contractor, as appropriate.
 - c. Local source of supply for parts and replacement.
 - d. Manufacturer.
 5. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. 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 in the format attached to the end of this Section.
- C. 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.
- D. Written Text:
1. Supplement product data for the particular installation.
 2. Organize in a consistent format under separate headings for different procedures.
 3. Provide a logical sequence of instructions for each procedure.
- E. Warranties and Bonds:
1. Copy of each Warranty, Bond and Service Contract Issued.
 2. Provide information sheet for Owner's personnel.
 3. Proper procedures in the event of failure.
 4. Instances which might affect the validity of warranties or bonds.
- F. Provide an installation, operation and maintenance manual for each item of equipment or system listed in the schedule of manuals in the quantity listed in the submittal schedule.
- G. Additional Requirements for Operation and Maintenance Data: The respective sections of specifications.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System. Include and identify:
1. Description of unit or system and component parts.
 2. Function, normal operating characteristics, and limiting conditions.
 3. Performance curves, with engineering data and tests.
 4. Complete nomenclature and commercial number of all replaceable parts.
- B. Installation Instructions, include:
1. Manufacturer's complete installation instructions and recommendations.
- C. Operating Procedures, include:
1. Startup, break-in, and routine normal operating instructions and sequences.
 2. Regulation, control, stopping, shutdown and emergency instructions.
 3. Summer and winter operating instructions, as applicable.
 4. Special operating instructions.
- D. Maintenance Requirements, include:
1. Routine procedures and guide for trouble-shooting.
 2. Disassembly, repair and reassembly instructions.
 3. Alignment, adjusting, balancing and checking instructions.
 4. Preventive maintenance information for each major component of every piece of equipment as required on the "Preventive Maintenance Information & Equipment Data Sheet" attached at the end of this section.

- E. Servicing and Lubrication Schedule, provide:
 1. List of lubricants required.
 2. Lubrication information for each major component of every piece of equipment as required on the "Preventive Maintenance Information & Equipment Data Sheet" attached at the end of this section.
- F. Provide manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
- I. Provide list of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide other data as required under pertinent sections of specifications.

1.07 MANUAL FOR ELECTRIC AND ELECTRONIC ITEMS OR SYSTEMS

- A. Description of system and component parts, include and identify:
 1. Function, normal operating characteristics, and limiting conditions.
 2. Performance curves, engineering data and tests.
 3. Complete nomenclature and commercial number of replaceable parts.
- B. Circuit Directories of Panelboards; provide:
 1. Electrical service characteristics
 2. Controls
 3. Communications
- C. Provide as-installed color coded wiring diagrams.
- D. Operating Procedures, include:
 1. Routine and normal operating instructions.
 2. Sequences required.
 3. Special operating instructions.
- E. Maintenance Requirements, include:
 1. Routine procedures and guide to trouble-shooting.
 2. Adjustment, balancing and checking instructions.
- F. Provide manufacturer's printed operation and maintenance instructions.
- G. Provide list of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- H. Provide other data as required under pertinent sections of specifications.

1.08 SUBMITTAL OF MANUALS

A. Preliminary Submittal of Manuals.

1. Quantity:
 - a. Submit number of preliminary manuals required by Contractor plus number to be retained by Engineer.
 - b. As scheduled.
2. Submit prior to the date of shipment of equipment or system.
3. Engineer will review for acceptance and return to Contractor with comments as appropriate.
4. Resubmittal Process:
 - a. If unacceptable, Contractor to resubmit same number of preliminary copies for Engineer's review.
 - b. Manuals will not be reviewed in detail once determined by the Engineer that a manual is not acceptable.
 - c. No partial payment will be made for equipment materials or related system materials delivered to the site until preliminary manuals for that equipment are submitted and are acceptable to the Engineer.

B. Final Submittal of Manuals

1. Quantity:
 - a. Submit number required by Contractor plus number to be retained by Engineer.
 - b. As scheduled.
2. Submit copies no less than 30 calendar days prior to putting equipment or system in service.
3. Engineer will review and compare with accepted preliminary manual.
4. If acceptable, manuals will be distributed as follows:
 - a. Contractor: For project record documents.
 - b. Engineer: For files.
 - c. Owner: Held by Engineer for later transmittal to Owner.
5. If not acceptable, all copies will be returned to Contractor for revision or retained by Engineer and the necessary revision data requested from Contractor, at Engineer's option.
6. No portion of the Work is substantially complete until final equipment and system manuals relating to that portion of the Work are accepted by Engineer.
7. Submit copies of any revisions found desirable during instruction of Owner's personnel, with instructions for insertion for revising copies of manual.

C. Funding agency funds may be withheld from Owner if Owner's acceptable operation and maintenance manual is not submitted as required by the agencies. If this occurs and such is partially attributable to a delay by the Contractor in submitting the required operation and maintenance materials:

1. Owner may withhold payments from Contractor.
2. Contractor shall not terminate or suspend work.
3. No additional costs or Contract time shall be claimed by Contractor if Owner withholds payments.

- D. If Contractor requires additional copies of the operation and maintenance manuals for the Contractor's, subcontractor's or suppliers' use, such may be submitted and will be returned upon review by the Engineer.

1.09 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. Owner may charge Contractor for all of Engineer's review time and costs at Engineer's standard billing rates through a credit by Change Order.
 - 2. Engineer will perform these unscheduled reviews in the same manner as other unscheduled work.

1.10 SUBSTANTIAL COMPLETION

- A. Project will not be considered substantially complete until final O&M Manuals and manufacturer's instruction of Owner's personnel have been accepted by Engineer.

1.11 SCHEDULE OF SUBMITTALS

- A. Prepare O&M Manuals for pieces of equipment where specified in the individual specification sections.
- B. Quantities to be Processed by Engineer:
 - 1. Preliminary Manuals: Submit Preliminary Manuals in **one** of the following formats:
 - a. Electronic Format:
 - 1) Electronic file in searchable .pdf format, delivered via email or on one (1) CD.
 - 2) One (1) printed copy properly formatted in binder with labels and dividers as specified. Engineer will retain copy.
 - 3) Engineer's submittal review including submittal file will be returned to Contractor in electronic format.
 - b. Or Printed Format:
 - 1) Two (2) printed copies properly formatted in binder with labels and dividers as specified.
 - 2) Engineer will return one (1) copy to Contractor.
 - 3) Any additional copies received will be discarded by Engineer.
 - 2. Final Manuals: Submit Final Manuals in **each** of the following formats:
 - a. Electronic Format:
 - 1) Three (3) copies of electronic files in searchable .pdf format, delivered on three (3) CDs.
 - b. And Printed Format:
 - 1) Three (3) printed copies.
 - 2) Engineer will retain three (3) copies.

C. The “Preventive Maintenance Information & Equipment Data Sheet” at end of this Section shall be completed and submitted with the preliminary and final operation and maintenance manuals.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

PREVENTIVE MAINTENANCE INFORMATION
AND
EQUIPMENT DATA SHEET

1. Equipment Name: _____
2. Equipment Number: _____
3. Equipment Manufacturer: _____
Address: _____
Phone: () _____
4. Equipment Supplier: _____
Address: _____
Phone: () _____
5. Nameplate Data:
Drive Unit: _____ hp, _____ rpm, _____ volts, _____ O _____ FLA
Motor class (drip-proof, TEFC, etc.) _____
Manufacturer _____
Model No. _____ Serial No. _____
Other _____

Driven Unit: Flow with units _____
Discharge Pressure with units _____
Equipment Type _____
Model No. _____ Serial No. _____
Other _____
6. Method of Power Transmission (direct coupled, V-belt, etc.) _____

7. Maintenance Requirements (list on next sheet)

Maintenance Operation: List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable.

Frequency: List required frequency of each maintenance operation.

Lubricant (if applicable): Refer by symbol to recommended lubricant from list in Item
8. Comments: Give other applicable comments concerning maintenance operation.

Maintenance Operation Frequency Lubricant Comments
 (including any special tools required)

A.

B.

C.

Use additional sheets if necessary.

9. Lubricant List (provide Mobil number in addition to any other recommended manufacturers):

| Reference Symbol | Mobil | Chevron | Shell | Arco | Or Equal |
|------------------------------------|---|---------|-------|------|----------|
| List symbols used in Item 7, above | List equivalent lubricants, as distributed by each manufacturer for the specific use recommended. | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

10. This data sheet prepared by: _____

Firm: _____

Date: _____

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain one (1) printed record copy of the following record documents at the site for the Owner:
 - 1. Drawings
 - 2. Engineer's response to Requests for Information (RFIs)
 - 3. Engineer Field Orders or written instructions
 - 4. Accepted Shop Drawings, Product Data and Samples
 - 5. Field Test records
 - 6. Receipts for delivery of items to Owner
- B. Prepare and submit to Owner record utility location survey data as specified herein.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with specification format.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by Engineer and Owner.

1.03 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by Engineer.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat, large printed letters.
- B. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.

- C. Drawings: Legibly mark to record actual construction:
1. Changes made by addenda.
 2. Depths of various elements of foundation in relation to finish first floor datum.
 3. Horizontal and vertical locations of underground utilities and appurtenances, including bends in pipes; and internal utilities and appurtenances concealed in the construction. Measure and show locations on the Record Drawings by either:
 - a. Referenced to permanent surface features or referenced to visible and accessible features of the structure.
 - b. Or tabulate and plot coordinates on the Record Drawings measured using survey grade GPS or GNSS to an accuracy of 0.1 meter (4 inches) using a baseline tied into the project coordinate system control points.
 4. Field changes of dimension and detail.
 5. Changes made by Field Order or by Change Order.
 6. Details not on original Contract Drawings.
 7. For sewer lines: Invert elevations at manholes, line and manhole alignment and locations, and location of each service line referenced by distance from downstream manhole and distance from sewer centerline to end of service line.

1.05 SUBMITTALS

- A. At Contract close-out, deliver Record Documents to Engineer for the Owner.
- B. Submit to-scale dimensioned electronic drawing files of major equipment items installed that were not the design basis manufacturer. Drawings shall show general arrangement plan and sections. Drawing files shall be in AutoCAD dwg format.
- C. Submit hard copies and electronic files of record utility location survey data as specified in Part 3.
- D. Accompany submittals with transmittal letter in duplicate, containing:
 1. Date
 2. Project title and number
 3. Contractor's name and address
 4. Title and number of each Record Document
 5. Signature of Contractor or his authorized representative

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 RECORD UTILITY LOCATION SURVEY REQUIREMENTS

- A. Provide and pay for professional survey services required for the Project.
 1. Survey work shall be performed by a land surveyor registered in the State of New Mexico, acceptable to Engineer and Owner. Submit name of surveyor prior to proceeding with survey.

- B. Contractor shall provide “as-built” horizontal and vertical utility location information in two (2) hard copies and an electronic file in AUTOCAD DWG (3D) format (AUTOCAD Release 14), and ArcGIS 10.3 Geodatabase file.
- C. The standard horizontal datum shall be the North American Datum 1983 (NAD83) and the survey shall be the New Mexico State Plane Coordinate System 1983 (NMSPCS83).
- D. The standard vertical datum shall be the North American Vertical Datum 1988 (NAVD88).
- E. Submit in electronic format.
- F. Provide description on the electronic file of survey control, horizontal datum, vertical datum used to prepare the “as-built” documents, including the following:
 - 1. Name, address, registration number, and telephone number of responsible professional land surveyor.
 - 2. Date survey is completed.
 - 3. Equipment used to conduct the survey.
 - 4. Horizontal and vertical control marks used to tie the survey to the NMSPC83 and NAVD88.
 - 5. Ground to Grid combined scale factor to be used.
 - 6. Map Projection: World Geodetic System WGS84 Web Mercator Auxiliary Sphere.
 - 7. Utility Line Work: Elevations shall be provided every 500 feet and at all grade break points, including all high and low points.
 - 8. Pipes and Appurtenances: All changes in elevations, i.e., top of pipe surfaces, pipe inverts, ground elevations (including hydrants and valves), etc. shall be measured and recorded.
 - 9. Layer and GIS Attributes to include:
 - a. Water Wells:
 - 1) Well: Casing inside diameter, pump setting depth below ground, if includes pitless adapter, if includes concrete cover pad.
 - 2) Well Pump: Type, manufacturer, model and impeller numbers, serial number, installation date.
 - 3) Meters: Type, manufacturer, model number, serial number, register multiplier.
 - b. Water Service Meters: Type, manufacturer, model number, serial number, register multiplier.
 - c. Air Valves: Type (air release, air/vacuum, combination, well service), manufacturer, model number, installation date.
 - d. Pressure Regulating Valves: Type (reducing, relief, sustaining, altitude), inlet size, port size, manufacturer, model number, pressure settings, installation date.
 - e. Buried Isolation Valves: Type (gate, butterfly, plug), size, manufacturer.
 - f. Fire Hydrants: Type (dry barrel, wet barrel), size, manufacturer, model number.

- g. Water and Sewer Pipes: Size, material, depth to top of water pipes, invert elevations of sewer pipes, date installed.
- h. Wastewater Lift Stations and Water Pump Stations:
 - 1) Pumps: Type, fluid pumped, manufacturer, model and impeller numbers, serial number, date installed.
 - 2) Pump Motors: Horsepower, voltage, phase, drive (constant speed or variable).
- i. Manholes: Depth, inlet and outlet pipe sizes.
- j. Chlorination Systems: Form of chlorine used (liquid bleach, tablets, gas, on-site generation), ventilation fans information, dose pump information (type, dose setting, manufacturer, model number, serial number), installation date.
- k. Tanks: Type (ground, buried, elevated), volume, diameter, height, overflow elevation, material (welded steel, bolted steel, concrete), installation date.

G. Survey Submittals:

- 1. Submit before certifying Project is substantially complete. Project will not be considered substantially complete without complete submittal of utility survey data and GIS attributes.

PART 4 PAYMENT

4.01 RECORD DRAWINGS

- A. Project record documents are incidental Work to the Contract Documents' bid items for which no separate payment will be made.
- B. No payment will be made to the Contractor for any portion of the Work for which the project record documents are not complete.

4.02 UTILITY SURVEY

- A. All surveying and GIS services are included in the Bid Schedule for this Work.

END OF SECTION

SECTION 01 78 40

DELIVERIES TO OWNER

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Obtain signature of Owner's representative's on Master List developed per Section 01 78 44 – Spare Parts and Maintenance Materials, for all spare parts, supplies, maintenance materials, salvage, and similar items delivered to Owner.
- B. Keep Master List and delivery receipts with Project Record Documents.
- C. All deliveries to Owner shall be coordinated to occur during hours designated by Owner's warehouse for receiving such items as described in Paragraph A.
- D. Deliver all materials to Owner at one time at end of the Project. Payment for Extra Materials will not be made until after the Owner has accepted delivery.
- E. Provide copy of Master List to both Owner and Engineer once all deliveries have been completed.
- F. The Owner and/or Engineer will check the delivered items against the Master List. If the delivery is not complete and as stated on List, or if items are not correctly marked, then provide a schedule of when the remaining items shall be delivered.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 39 – Project Record Documents
- B. Section 01 78 44 – Spare Parts and Maintenance Materials

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 44

SPARE PARTS AND MAINTENANCE MATERIALS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Provide spare parts and maintenance materials as specified in this Section and in specifications for work in Divisions 2 through 48 that are part of this project.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 40 – Deliveries to Owner.

1.03 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:
 - 1. Prepare and submit a Master List of all spare parts and maintenance materials to be delivered to Owner. Specific requirements for those spare parts and maintenance materials to be delivered are as stated within individual Specification Sections for work in Divisions 2 through 48.

1.04 MAINTENANCE MATERIALS

- A. Provide:
 - 1. Lubricant for all equipment and facilities sufficient for three months normal usage, unless specified otherwise.
 - 2. Any non-standard tools required to adjust or service equipment supplied.
- B. Label all materials by equipment name and usage.

1.05 SPARE PARTS

- A. Label and identify by equipment name, part name, part number.
- B. Packaged for storage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 79 01

MANUFACTURER'S INSTRUCTION OF OWNER'S PERSONNEL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Instruction of Owner's Personnel
- B. Schedule of Instruction

1.02 QUALITY ASSURANCE

- A. Instruction shall be performed by a qualified, experienced regular employee of the equipment or system manufacturer or a full-time field service representative (not sales personnel) approved by the equipment or system manufacturer.

1.03 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Owner's designated personnel in the operation, adjustment and maintenance of all scheduled products, equipment and systems.
- B. Manufacturer's Operation and Maintenance Manual shall constitute the basis of instruction for:
 - 1. Review of contents of manual with Owner's personnel in full detail to explain all aspects of operation and maintenance.
 - 2. Review in field with Owner's personnel in full detail the operation and maintenance of each scheduled system or equipment.
- C. Additional requirements for specialized instruction of Owner's personnel are given in the detailed equipment specifications.
- D. Submit in writing proposed dates for instruction of Owner's personnel at least 15 days in advance of date when instruction is proposed to start; resubmit alternate schedule if proposed dates are not acceptable to Engineer or Owner.
- E. Do not begin instruction of Owner's personnel until equipment for which instruction is required is fully operational and functioning satisfactorily and Final Operation and Maintenance Manuals for same have been reviewed and accepted by Engineer.
- F. If the Engineer or Owner judges the instruction to be incomplete, inadequate, or inaccurate, additional instruction shall be scheduled and provided at no additional cost to the Owner.

- G. Prepare and include additional data when the need for such data becomes apparent during the instruction of Owner's personnel or as necessary to provide complete operation and maintenance instructions.

1.04 SCHEDULE OF INSTRUCTION

- A. Instruct Owner's personnel on pieces of equipment where specified in the individual specification sections or as scheduled herein.
- B. See "Training Schedule" attached to end of this Section. Verify that all training requirements specified in the Contract documents are listed on the Training Schedule. Provide all training specified in the Contract Documents whether or not the sessions are listed on the Schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Demolition and salvage of existing facilities as indicated on Drawings and/or required for completion of works under contract.

1.02 ADDITIONAL REQUIREMENTS

- A. Disposal:
 - 1. Contractor's full responsibility unless otherwise specifically indicated.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Plug with grout all exposed pipe lines remaining in place.
- B. All motors, valves, pumps, electrical panels, tanks, meters, pipe, fittings, grating, building, and items designated on the drawings for demolition.
- C. All underground piping designated to be abandoned in place, shall be flushed clean and plugged on all ends with concrete grout.

3.02 EXISTING BOOSTER STATION DEMOLITION

- A. Comply with OSHA confined space entry procedures for all work inside existing booster station.
- B. Removal and disposal of the roof, building equipment and walls to the concrete floor. The floor may remain at the contractor's option.
- C. The void created by the demolition of the building shall be filled with clean fill to the grades of natural surroundings.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Cast-In-Place Concrete
- B. Reinforcing Steel
- C. Forms
- D. Admixtures
- E. Embedments

1.02 ADDITIONAL REQUIREMENTS SPECIFIED ELSEWHERE

- A. Section 01 45 23: Testing Laboratory Services.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. Concrete mix design.
 - 2. Proposed admixtures, per ACI 318.
 - 3. Reinforcing bar lists, fabrication, and placement Drawings for structures, in conformance with ACI 315R – Guide to Presenting Reinforcing Steel Design Details.
 - 4. Concrete accessories.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Storage:
 - 1. Cement and fly ash:
 - a. Store in moisture-proof enclosures.
 - b. Do not use if caked or lumpy.
 - 2. Aggregate: Store to prevent segregation and inclusion of foreign materials.
 - 3. Reinforcing steel: Store on supports which will keep it from contact with the ground.
 - 4. Rubber and plastic materials:
 - a. Store in a cool place.
 - b. Do not expose to direct sunlight.

PART 2 PRODUCTS

2.01 MATERIALS

A. Forms:

1. Chamfer strips: Clear white pine, surface against concrete planed.
2. Form Coating: Industrial lubricants Master Builders Solutions US, LLC “MasterFinish Series”, “Nox-crete Form Coating”, “L&M Debond”, Protex “Pro-Cote”, Richmond “Rich Cote”, or Engineer reviewed equivalent.
3. Form Release Agent: Release agent that will not adversely affect concrete or interfere with the application of coatings. Master Builders Solutions US, LLC “MasterFinish RL Series”; or Engineer reviewed equivalent.
4. Form ties: Removable end, permanently embedded body type not requiring auxiliary spreaders, with cones on outer ends, embedded portion 1" minimum back from concrete face. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.
5. Earth cuts shall not be used as forms for vertical surfaces, unless indicated on project drawings.

B. Reinforcing Steel:

1. Bars: ASTM A615, Grade 60.
2. Welded Wire Reinforcement: ASTM A1064 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
3. Bar supports: PS7; CRSI Class B, fabricated from galvanized wire.

C. Welded Wire Reinforcement: ASTM A1064, furnished in flat sheets.

D. Fibrous Reinforcement:

1. Plastic Shrinkage Cracking Control During Curing: Synthetic microfibers, monofilament or fibrillated polypropylene microfibers, engineered and designed for use in concrete, conforming to ASTM C1116 Type III products. Master Builders Solutions US, LLC “MasterFiber M or F Series”, or Engineer reviewed equivalent.
2. Temperature and Shrinkage Reinforcement: Synthetic macrofibers engineered and designed for use in concrete, conforming to ASTM C1116 Type III products. Master Builders Solutions US, LLC “MasterFiber MAC Series”, or Engineer reviewed equivalent.

E. Concrete:

1. Cement: ASTM C150, Type I or II. Use Type III only with prior written approval of Engineer.
2. Fly ash: ASTM C618, Class F, except loss on ignition not more than 5%
3. Fine aggregate: Clean, natural sand, ASTM C33.
4. Coarse aggregate: Crushed rock, natural gravel or other inert granular material, ASTM C33 except clay and shale particles no more than 1%.
5. Water: ASTM C1602 Clean, fresh and potable.

6. Admixtures:
- a. Air-Entraining Admixture: ASTM C260; Master Builders Solutions US, LLC “MasterAir Series”, Grace “Darex AEA”, Sika “AEK”, or Engineer reviewed equivalent.
 - b. Water-Reducing Admixture: ASTM C494, Type A; Master Builders Solutions US, LLC “MasterPozzoloth Series or MasterPolyheed Series”; Sika “Plastocrete 161”, or Engineer reviewed equivalent.
 - c. Retarding Admixture: ASTM C494, Type B; Master Builders Solutions US, LLC “MasterSet R Series or MasterSet DELVO Series”, Grace “Duratard HC”, Protex “Protard”, Sika “Plastiment”, or Engineer reviewed equivalent.
 - d. Accelerating Admixture: ASTM C494, Type C494, Type C; Master Builders Solutions US, LLC “MasterSet AC 534 or MasterSet FP 20”; Sika “SikaSet NC”, or Engineer reviewed equivalent.
 - e. Water-Reducing Retarding Admixture: ASTM C494, Type D; Master Builders Solutions US, LLC “MasterSet R Series or MasterSet DELVO Series”, or Engineer reviewed equivalent.
 - f. Water-Reducing Accelerating Admixture: ASTM C494, Type E; Master Builders Solutions US, LLC “MasterSet FP 20”, or Engineer reviewed equivalent.
 - g. High-Range Water-Reducing Admixture: ASTM C494, Type F; Master Builders Solutions US, LLC “MasterGlenium Series or Master Rheobuild 1000”, Grace “WRD A-HC”, Sika “Plastocrete”, or Engineer reviewed equivalent.
 - h. Workability-Retaining Admixture: ASTM C494, Type S; Admixture shall retain concrete workability without affecting time of setting or early-age strength development. Master Builders Solutions US, LLC “MasterSure Z 60”, or Engineer reviewed equivalent.
 - i. Strength-Enhancing Admixture: ASTM C494, Type S; Liquid crystalline calcium silicate hydrate nanoparticle admixture that increases both early- and late-age strength development without affecting concrete setting time. Master Builders Solutions US, LLC “Master X-Seed 55”, or Engineer reviewed equivalent.
 - j. Permeability-Reducing Admixture: ASTM C494, Type S; Shall be a Portland cement-based crystalline capillary waterproofing admixture that reacts in concrete to form non-soluble crystalline hydration products in the capillary pores of the concrete. Master Builders Solutions US, LLC “MasterLife 300 Series”, or Engineer reviewed equivalent.
 - k. Corrosion-Inhibiting Admixture: Shall be a nominal 30 percent solution of calcium nitrate or an amine/ester-based organic corrosion-inhibiting admixture. Master Builders Solutions US, LLC “MasterLife CI 30 or MasterLife CI 222”, or Engineer reviewed equivalent.
 - l. Shrinkage-Reducing Admixture: ASTM C494, Type S; Master Builders Solutions US, LLC “MasterLife SRA Series or MasterLife CRA 007”, or Engineer reviewed equivalent.
 - m. Alkali-Silica Reaction Inhibiting Admixture: ASTM C494, Type S; Master Builders Solutions US, LLC “MasterLife ASR 30”, or Engineer reviewed equivalent.

- n. Color Pigment: Colored water-reducing admixtures, color stable, free of carbon black, nonfading, and resistant to lime and other alkalis. Master Builders Solutions US, LLC, or Engineer reviewed equivalent.

F. Accessories:

- 1. Polyethylene film: PS17, 6 mil.
- 2. Membrane curing compound and floor sealer: FS TT-C-600, Type 1; chlorinated rubber, minimum 18% solids or acrylic-based; Master Builders Solutions US, LLC "MasterKure CC Series"; Grace "Dekote", Process Solvent "Concrete Treatment ALX-9", Protex "Triple Seal Series CRD-18", TK Product "Tri-Kote TK-18", or Engineer reviewed equivalent.
- 3. Expansion and contraction joint: Elastic
 - a. Rubber: Dumbell, 9" wide, 3/8" thick with 3/4" bead on each end; WR Grace, U.S. Rubber, William or Engineer reviewed equivalent.
 - b. PVC: Ribbed or serrated, 9" wide, 3/8" thick with "U" or "O" bulb closed center section; Sika Greenstreak, WR Grace, WR Meadows, Vinylex or Engineer reviewed equivalent.
- 4. Exterior expansion joint material: Bituminous impregnated felt fiberboards; ASTM D994; or asphalt impregnated cellular fibers, ASTM D1751.
- 5. Bond break joint material: 30 lb. asphalt saturated felt, ASTM D226.
- 6. Interior slab construction joint material: Preformed 20 gage steel or as indicated on Drawings.

2.02 CONCRETE MIX

- A. Comply with ASTM C94.
- B. Water to Cementitious Material Ratio: Maximum 0.50.
- C. Fly Ash: Not less than 10% and not more than 25% of the total cementitious material weight.
- D. Slump: Maximum 4.0", unless otherwise scheduled. Maximum of 9.0" for concretes containing a high-range water reducing admixture, unless otherwise scheduled.
- E. Compressive Strength: 28 days - 4000 psi, unless otherwise scheduled or shown on the Drawings.
- F. Volumetric Air Content: 4.5% to 7.5%, air content shall not exceed 3% for interior slabs to be hard-trowel finished.
- G. Admixtures:
 - 1. Content, batching method, and time of introduction in accordance with the manufacturer's recommendations for compliance with this Specification.
 - 2. Include admixtures required to meet job conditions.
 - 3. Calcium chloride shall not be used.
- H. Coarse Aggregate:
 - 1. Maximum nominal dimension in accordance with ACI 318.

- I. Add fibrous reinforcing (type and dosage as recommended by manufacturer) to concrete at batch plant for all concrete where indicated on Drawings.
- J. Consistency:
 - 1. Suitable for the placement conditions.
 - 2. Slump uniform.
 - 3. Aggregate floating uniformly throughout the concrete mass.
 - 4. Flow sluggishly when vibrated or spaded.
 - 5. Adjust mix in field, with Engineer's approval, as required to meet specifications.

2.03 FABRICATION

- A. Reinforcing Steel:
 - 1. Fabricate in accordance with ACI 315 and 318 except as specified or indicated on Drawings.
 - 2. Accurately fabricated.
 - 3. Free from loose rust, scale, and contaminants which will reduce bond.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Forms:
 - 1. In accordance with ACI 347.
 - 2. Mortartight.
 - 3. Exposed concrete surfaces free from irregularities.
 - 4. True to line, grades, and dimensions shown on the Drawings.
 - 5. Rigid and properly braced.
 - 6. Ties arranged so that metal will not show or discolor concrete surface.
 - 7. Bevel or chamfer exterior corners.
 - 8. Coat forms with acceptable release material.
- B. Reinforcing Steel:
 - 1. Remove loose rust, scale, grease or any coating which may impair bond to concrete. Remove all rust that can be wiped off with a cloth.
 - 2. Provide supports to provide minimum cover and spacing.
 - 3. Provide splice lengths as required by ACI 318.
- C. Embedments:
 - 1. Accurately placed for the purpose intended.
 - 2. Remove loose rust, scale, and other foreign matter before placing concrete. Remove all rust that can be wiped off with a cloth.

D. Concrete:

1. Place before initial set has occurred, but in no event after the concrete has contained its water content for more than 30 minutes, unless admixtures are used properly to extend the time and the admixture manufacturer can demonstrate successful performance under similar job conditions.
2. Place concrete on compacted moist surfaces, free from standing or running water.
3. Concrete to be conveyed and placed in an approved manner to prevent segregation of the coarse aggregate.
4. Cold weather concreting:
 - a. Comply with ACI 306.1.
5. Hot weather concreting:
 - a. Comply with ACI 305.1.

E. Expansion and Contraction Joints:

1. Provide as indicated on the Drawings.

F. Finishing:

1. Not required on buried surfaces.
2. No special concrete or cement mortar topping allowed for slab finish.
3. Slabs brought to true and even finish by screeding, floating, and finishing to product a smooth impervious surface, free from blemishes.
4. Unless otherwise specified or shown on the Drawings, a steel trowel finish shall be applied.
5. Excess water shall not be present when the finish is made.

G. Curing:

1. Cure concrete by approved method which will keep surfaces adequately wet or protected from moisture loss for the curing period.

H. Repairing Defective Concrete:

1. Repair defects in formed concrete surfaces within 24 hours.
2. Replace defective concrete within 48 hours.
3. Cut out and remove to sound concrete honeycombed or otherwise defective concrete.
4. Cut edges square to avoid feathering.
5. Comply with ACI 301 section on repairing defective concrete.
6. Perform repair work so as not to interfere with thorough curing of adjacent concrete.
7. Adequately cure repair work.

3.02 FIELD QUALITY CONTROL

A. Perform Field Control Test:

1. Tests by personnel certified to ACI Field Testing Technician Grade 1.
2. Make tests in presence of Engineer's representative.
3. Provide all equipment, supplies, and the services of one or more employees, as required.
4. The test frequencies specified are minimum; perform additional tests as required by the job conditions.

- B. Testing Frequency: Obtain at least one composite sample for each 150 cu. yd., or fraction thereof of each concrete mixture placed each day.
- C. Slump: Perform a test for each load in accordance with ASTM C143.
- D. Air Content: Test one sample from one of each three batches made and from each batch from which test cylinders are made, in accordance with ASTM C231.
- E. Temperature: One test hourly when air temperature is 40°F and below or 80°F and above, and one test for each composite sample, in accordance with ASTM C1064.
- F. Density: Fresh density of sampled concrete; one test for each composite sample, but not less than one test for each day's placement of each concrete mixture, in accordance with ASTM C138.
- G. Compression Tests:
 - 1. Make one set of four cylinders from every load or batch or portion thereof.
 - 2. Make, cure, store, and deliver cylinders in accordance with ASTM C31.
 - 3. Mark or tag each set of test cylinders with the date and time of day the cylinders were made, the location in the work where the concrete represented by the cylinders was placed, the delivery truck or batch number, the air content, and the slump.
 - 4. Testing Laboratory Will:
 - a. Test one cylinder in each set at 7 days.
 - b. Test two cylinders from each set at 28 days.
 - c. If compressive strength does not reach specified compressive strength at 28 days, test remaining cylinder at 56 days.
 - d. Do not test or discard remaining cylinder until so instructed by the Engineer.
 - e. Engineer will evaluate in accordance with ACI 214 and 318.
 - f. Test in accordance with ASTM C39.
 - 5. 4" dia. x 8" cylinders may only be used under the following conditions:
 - a. Coarse aggregate size for all mixes used on the project do not exceed 1-1/4" maximum size, and
 - b. Test cylinders for all mixes used on the project shall be the same size.
- H. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.
- I. 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.

END OF SECTION

SECTION 05 50 01

ANCHOR BOLTS AND CHEMICAL ANCHORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in anchor bolts for structural connections and to secure equipment.
- B. Bolts, threaded rods, and deformed rods to be placed in holes drilled into hardened concrete or masonry and secured by chemical grouts.

1.02 SUBMITTALS

- A. Section 01 33 23: Shop Drawings, Product Data, and Samples
- B. Product Data

1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver anchor bolts and templates in time to permit setting when structural concrete is placed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bolts:
 - 1. Carbon steel: ASTM A 307
 - 2. Galvanized steel: Carbon steel, hot-dip galvanized, ASTM A 153; or zinc plated, ASTM A 164, type GS
 - 3. Stainless steel: ASTM F 593
- B. Nuts:
 - 1. Same material as bolts.
 - 2. Carbon steel: ASTM A 563, Grade B heavy hexagonal
 - 3. Stainless steel: ASTM F 594
 - 4. Self-locking: Prevailing torque, IFI-100, Grade A
- C. Washers:
 - 1. Same material as bolts.
 - 2. Flat: ASTM F 436
 - 3. Locking: Spring type ANSI B27.1

- D. Sleeves:
 - 1. Pipe: ASTM A 53, galvanized
 - 2. Bearing plates: ASTM A 36, galvanized

- E. Chemical Anchor Systems:
 - 1. Fastener or connector: Bolt, threaded rod or deformed rod as shown on Drawings, material as indicated on Drawings or specified.
 - 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, products which may be used in the work include, but are not limited to, the following:
 - a. Epcon Epoxy Injection System as manufactured by ITW Ramset/Red Head.
 - b. HIT Renovation Anchor System as manufactured by the HILTI Corporation.
 - c. Molly PARAFast Resin Mortar as manufactured by the Molly Fastening Systems Group of Emhart Corporation.

2.02 FABRICATION AND MANUFACTURE

- A. Anchor Bolts:
 - 1. 3/4" minimum, except as indicated on the Drawings.
 - 2. Type:
 - a. General use: L-shaped hook type.
 - b. Where indicated on Drawings or specified:
 - 1) Straight bolt with square head.
 - 2) Straight bolt with square plate welded to bolt and nut welded to plate and bolt.
 - 3) Through-bolt with sleeve and square plate assembly.
 - 4) Coupled bolt with sleeve welded to square plate and bolt.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that holes for anchor bolts in forms and templates match applicable equipment shop drawings.

3.02 INSTALLATION

A. Anchor Bolts:

1. Where installed in cast-in-place concrete, install a nut on the concrete side of the form or supporting template.
2. Provide 3 nuts for each equipment anchor bolt for which a lock nut is indicated, 2 for others.
3. Sleeved anchor bolts:
 - a. Centered in pipe sleeve.
 - b. Sleeve ID: Approximately 2-1/2 times bolt OD.
 - c. Sleeve length: Approximately 8 times bolt OD.
 - d. Bearing plate minimum thickness: 1/2 times 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 Anchor Systems:

1. Install in conformity with the manufacturer's instructions.

3.03 SCHEDULE

- A. Anchor bolts to be Type 316 stainless steel unless noted otherwise on Drawings.
- B. All sleeves and plates galvanized unless noted otherwise on Drawings.
- C. Wedge anchors not acceptable unless noted otherwise on Drawings.

END OF SECTION

SECTION 26 00 10

GENERAL CONDITIONS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Labor, equipment, tools, materials, supplies, and operations necessary to install a complete electrical system, including that which may be reasonably implied on the Drawings or in the Specifications as being incidental to the work of Division 26.
- B. Labor, equipment, tools, materials, supplies, and operations required to make a completely electrically operable system of the equipment furnished under other Divisions of this Specification.

1.02 MISCELLANEOUS MATERIALS

- A. The Drawings are not intended to and do not show all equipment such as junction boxes, outlet boxes, conduit, fittings, mounting and miscellaneous hardware, and similar. Even though such items may not be specifically mentioned in the Specifications nor shown on the Drawings, nor noted on Shop Drawings, if they are necessary to make a complete installation, include them in the work required under this Division.

1.03 QUALITY ASSURANCE

- A. Use only thoroughly trained and experienced personnel who are completely familiar with the requirements of this work and with the recommendations of the manufacturer of the specified items to fabricate, install, and test the work of this Division.
- B. Where the Specifications or Drawings call for equipment or methods to be of better quality or higher standards than required by referenced Codes or Standards, the Specifications and Drawings shall prevail.

1.04 SUBSTITUTIONS

- A. When requesting substitution of material for products specified in this Division, comply with Section 01 25 00 – Substitution Procedures. Include as part of the request detailed descriptions and drawings showing all resultant changes to the electrical work.
- B. The design of certain equipment may be related to factors not immediately obvious. Changes in design of equipment may require technical justification, or require changes be made in other equipment to match the proposed changes, or require the equipment be supplied as specified, or any combination of the above, at no additional cost to the Owner.

1.05 LOCATION OF ELECTRIC EQUIPMENT

- A. The Drawings or other Specification sections define the approximate location of services, cabinets, panelboards, switches, lights, receptacles, and other equipment. Determine the most suitable location by actual measurement during construction. Maintain clearance required by NEC Article 110. Propose final location and obtain approval of the Engineer in advance of installation.
- B. Coordinate location and configuration of electrical work with the work of other trades to avoid interference, to assure convenient access for operation and maintenance of equipment, for optimum luminaire placement, and for neat appearance.

1.06 SIZE AND RATING OF MATERIALS

- A. The size and rating of the conductors, conduits, overcurrent protection devices, disconnect devices, motor starters, and other related equipment used to provide and control electric supply to the various power consuming equipment furnished under this contract have been determined based on the requirements of the specified equipment. If the requirements of the power consuming equipment actually furnished causes a need to change the rating of any of these materials:
 - 1. Consult with the Engineer to determine the changes necessary to provide and control electric supply to the equipment furnished, and
 - 2. Install the agreed upon materials at no increase in the Contract amount or time.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 00 20

CODES, PERMITS, AND FINES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 COMPLIANCE

- A. This Section applies to Division 26 and to Division 40 Section 40 61 13 – Control System Documents and Procedures and to Sections referenced therein.
- B. Perform Electrical Work and provide material and equipment in compliance with the State of New Mexico Electrical Code (NMEC) NMAC, Title 14, Chapter 10, Part 4 and other national, state, and local codes, regulations, laws, and ordinances. It will be the responsibility of the Engineer to resolve conflicts between the above and the Specifications or the Drawings.
- C. Without relieving the Contractor from the obligation to comply with all provisions of the NMEC and other codes and standards, attention is directed to NMAC 14.10.4.11 B. (1) “Section 110.2 Approval.” Approval by the Engineer is required for all electrical wiring, equipment or material for which a (UL) safety standard does not exist.

1.02 PERMITS

- A. Obtain electrical permits. This applies whether or not the Authority Having Jurisdiction (AHJ) requires a permit for the structural / process portion of a project.

1.03 INSPECTIONS AND CERTIFICATES

- A. Arrange and pay for electrical inspections.
- B. Correct deficiencies noted as a result of inspections then arrange for additional inspections.
- C. Furnish properly executed certificates of final electrical inspection and approval from the AHJ at the conclusion of the work and before final acceptance of the Work by the Owner.
- D. It is recognized that inspection by the AHJ is intended to determine whether the Work is in compliance with applicable codes, not to determine whether the Work is in compliance with the Contract Documents.

1.04 PAYMENTS TO THE AHJ

- A. Include in the Bid the cost of permits and initial inspections.

- B. No change in the Contract Amount will be allowed for other costs associated with this Section, such as but not limited to the cost for certification of non-labeled equipment, additional inspections, and fines / penalties levied by the AHJ. Exception: If a Change Order results in charges from the AHJ for an additional permit and / or additional inspections, then itemized, documented costs will be included in the Change Order amount.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 00 40

PROJECT RECORD DOCUMENTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 GENERAL

- A. Except as may be stated below, this Section applies to Division 26, to Section 40 61 13 – Control System Documents and Procedures and to Sections referenced therein. It contains minimum requirements; and also complies with Section 01 78 39 – Project Record Documents.

1.02 LEGIBILITY

- A. Materials that are not sufficiently legible to the Engineer may be returned without being reviewed.
- B. Materials of marginal legibility may be accepted for preliminary review but rejected for use as final Record Documents.
- C. Minimum text height on project-specific Submittal Drawings such as schematics, connection diagrams, loop diagrams, and similar: 1/8 inch.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONTRACT DRAWINGS

- A. Maintain a complete set of Contract Drawings in “Record” condition. Mark, initial, and date changes, modifications, or corrections as they occur.
- B. Show by dimensions and by correct scale the location and burial depth of underground conduits, duct banks, conduit stub outs, and direct buried cables. Show location and depth at each end and at every bend.
- C. Show all differences between electrical and instrumentation design and the actual construction of electrical and instrumentation systems.
- D. Have the Drawings available for inspection by the Engineer during standard work hours at the project site.
- E. Furnish the “Record” Contract Drawings to the Engineer after completing the work and tests.

3.02 RECORD DRAWINGS / SUBMITTALS

- A. Maintain a complete set of Shop Drawings in “Record” condition. Mark, initial and date changes, modifications, or corrections as they occur.
- B. Where required in the equipment sections, return field marked Shop Drawings to the respective manufacturer who shall transfer “Record” markings to the original tracings, stamp the originals “Record” and place the date adjacent to the stamp.
- C. Where a connection diagram is required as part of the submittals for a Section of these Specifications, whether in Division 26 or Division 40 or not, the Record documents for that section shall include copies of the connection diagrams that show all field interconnection information. Where a wire goes to a field device, such as a STOP pushbutton, the interconnection information may simply read “STOP pushbutton, field.” Where a wire goes to an equipment where it is terminated on a terminal board, show the wire destination by equipment name or abbreviation, then terminal board number, then terminal point number, VFD1-B 6 for example.
- D. Furnish other “Record” Shop Drawings to the Engineer.

END OF SECTION

SECTION 26 00 60

EXTRA MATERIALS AND SPARES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extra materials, such as spare parts, maintenance materials, and special tools for Division 26, Section 40 61 13 – Control System Documents and Procedures, for Sections referenced therein, and for other Sections as required below.
- B. Marking, packaging, and delivery of extra materials as required in Division 1.

1.02 SUBMITTALS

- A. Include detailed descriptions of extra materials in the submittal materials for specific Sections and show in the Master List as required in Section 01 78 44 – Spare Parts and Maintenance Materials.

PART 2 PRODUCTS

2.01 EXTRA MATERIALS AND SPARES REQUIRED

- A. If the equipment submitted differs from that specified and the manufacturer recommends extra materials, provide extra materials of equal function to those specified. Also provide additional materials if so recommended in the manufacturer's Operation and Maintenance Manual. Information on all additional materials and substituted materials shall be properly submitted to the Engineer for approval before materials are purchased.
- B. Regardless of the Division / Section in which the equipment is specified, provide spares of every type and rating of fuse used in the project. Provide minimum quantity as shown below but provide more if so specified elsewhere.
 - 1. Fuses of 250V or Less:
 - a. One standard package or ten, whichever is greater.
 - 2. 600V Fuses:
 - a. Six.
- C. Regardless of the Division / Section in which the equipment is specified, provide minimum quantity of spares as shown below but provide more if so specified elsewhere.
 - 1. 24V Power Supply:
 - a. One spare.

2. Programmable Logic Controller (PLC) Power Supply Card or Module:
 - a. One spare.
3. Ethernet Switch:
 - a. One spare.

D. As required in specific Sections.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 04 20

THREE PHASE MOTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Three phase, 460 volt motors.

1.02 SYSTEM DESCRIPTION

- A. Connect and test motors as shown on the Drawings, and as specified elsewhere.
- B. Where facility equipment described in other Sections incorporate three phase, 460 volt motors, furnish motors which conform to this Section.
- C. Except as specifically required below, motors furnished as an integral part of a submersible pump assembly, submersible mixer assembly, an electric valve actuator, or a refrigeration compressor assembly need not conform to this Section.

1.03 SUBMITTALS

- A. Submit motor information as part of the respective equipment submittal.
- B. Complete descriptive catalog cuts.
- C. Rating sheet which shows: Voltage, phase, HP, FLA, LRA, RPM, guaranteed efficiency and power factor at 50 percent, 75 percent, 100 percent load, and enclosure type.

1.04 OPERATION AND MAINTENANCE DATA

- A. Provide as part of the respective equipment submittal: Motor manufacturer's standard manual.

PART 2 PRODUCTS

2.01 THREE PHASE MOTOR REQUIREMENTS

- A. Rated 460V, 3 phase, 60 Hertz, 1.15 service factor unless specified otherwise under the equipment specifications.
- B. NEMA Design B with locked rotor and breakdown torques adequate for the specific application. Continuous duty.
- C. Cast iron frames, copper windings.

- D. Horsepower output sufficient to drive respective equipment at full load at 1.0 service factor (i.e., no allowance of 1.15 service factor in sizing HP) and without having the windings exceed rated temperature at 40 degrees C. ambient at the altitude of the project. Minimum horsepower as required under the Equipment Specifications.
- E. Provide inverter duty motors for motors which are powered by adjustable frequency drives, whether called for in the equipment specification or not, including motors for submersible pumps. Comply with the requirements of NEMA MGI Part 31.
- F. Enclosures:
 - 1. Provide enclosure types as specified in equipment Sections.
 - 2. If not specified then comply with the following.
 - a. Motors driving fans, turbines, compressors:
 - 1) Indoors: ODP.
 - 2) Outdoors: TEFC or TENV.
 - b. Motors driving pumps, clarifiers, bar screens, and other process equipment: TEFC or TENV.
- G. Motors for use in NEC 500/501, etc., hazardous areas: TEFC or TENV and UL listed as suitable for use in the area where installed, whether so required in the equipment Section or not.
- H. Conduit Boxes:
 - 1. Oversized.
 - 2. Weatherproof cast iron on TEFC/TENV motors.
 - 3. Manufacturer's standard material on ODP motors.
- I. Furnish motors with efficiency equal to or greater than NEMA Premium Efficiency requirements. Determine efficiency ratings using testing methods and provide labeling as required in NEMA MG1-12.
- J. Provide stainless steel nameplate that is screwed or riveted onto the motor. As a minimum show:
 - 1. Manufacturer's Name
 - 2. Model Number
 - 3. Serial Number
 - 4. Design Class
 - 5. Frame Size
 - 6. Horsepower
 - 7. Service Factor
 - 8. Locked Rotor Code
 - 9. Class of Insulation
 - 10. Voltage, phases, frequency
 - 11. Full Load Amps
 - 12. Full Load Speed
 - 13. NEMA Efficiency
 - 14. Rated Ambient Operating Temperature

15. Voltage Connection Schematic
16. AFBMA Number for Each Ball Bearing

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE WIRE AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Low voltage wire and cable.

1.02 SYSTEM DESCRIPTION

- A. 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.
- B. Install, connect, mark, and test all wire and cable.

1.03 SUBMITTALS

- A. Paragraph 2.01: Not required.
- B. Paragraphs 2.02 through 2.07: Manufacturer's standard literature.

PART 2 PRODUCTS

2.01 600V POWER AND GENERAL PURPOSE WIRE

- A. Meet NEC 310, UL 83, and the ANSI C8 Series.
- B. Conductor: Copper.
- C. NEC Type: THWN/THHN
- D. Minimum wire size unless specifically noted otherwise on the Drawings:
 - 1. 480V: #10 AWG.
 - 2. 120/208/240V: #12 AWG.
 - 3. Control: #14 AWG, stranded.
 - 4. Grounding/bonding conductors: #12, except #14 for control runs.

2.02 600 POWER AND GENERAL PURPOSE WIRE (ALUMINUM)

- A. Meet UL Standard 1581 for stranded AA-800 series aluminum allow conductors.
- B. Conductor: Aluminum.
- C. NEC Type: XHHW-2.

D. Wire Size: #6 to 1000 kcmil.

2.03 SHIELDED CABLE (TWSH)

A. 90 degree C. operation.

B. Single Pair: Stranded bare or tinned copper, #16 AWG with 600V insulation, meet NEC 336.

C. Insulation: Extruded PE, PVC, or PVC/Nylon.

D. Conductor Identification: Colored pairs.

E. Pair Construction: Twisted pair, lay 1-1/2 inches to 2-1/2 inches.

F. Core Tape: Polyester with 25 percent overlap.

G. Shield: Polyester supported aluminum tape with tinned #18 AWG copper drain wire.

H. Jacket: Ultraviolet stabilized, flame retardant extruded black PVC with non-hygroscopic rip cord.

2.04 OTHER WIRE AND CABLES

A. As supplied under other Sections or as required on the Drawings or Schedules.

PART 3 EXECUTION

3.01 COLOR CODING

A. 600V Power and General Purpose Wire:

1. Neutral and ground as required by NEC. Where two neutrals are run in a conduit, make one white and one grey. For three: one white, one grey, and one white that is field marked with a band of grey tape at each end.
2. 480V Phases: Brown, orange, yellow (A,B,C, respectively).
3. 120/240V: Black and blue.
4. 120/208V: Black, blue, violet (A,B,C, respectively).
5. Motor Control Leads:
 - a. THWN/THHN: Red to field devices with white (grey) neutral.
 - b. Tray Cable: Inherent to cable.
6. THWN/THHN: #14 to #10 AWG: Colored insulation.
7. THWN/THHN: Larger than #0: Tape may be used.

B. TWSH: Inherent to cable construction.

C. Color shall be the same from end to end of a run. Do not change conductor color at splices or terminal boards.

3.02 MARKING

- A. Mark all field conductors unless directed otherwise on the Drawings or Schedules.
- B. Text:
 - 1. Power and Control Circuits associated with MCC:
 - a. Mark power feeders to motors with the motor control center number, cubicle number and terminal strip number, such as, 28 2A-T1 for MCC 28, cubicle 2A, phase A.
 - b. Mark control conductors with motor tag number followed by MCC cubicle terminal point number; such as, M3941-X2. Use pump or equipment number in the absence of a tag number.
 - 2. All lighting circuits and power circuits not associated with a motor control center (MCC): Panel designation and circuit number, such as, LP1-12, or PPA-23,25,27.
 - 3. Lighting and power circuits from a panelboard furnished as an integral part of a MCC: Panel designation and circuit number, such as, LP1-12, or PPA-23,25,27.
 - 4. Control Circuits not associated with MCC: Terminal board number or wire number shown on schematics and/or submittals.
 - 5. Instrumentation (all ends of complete run of all milliamp signal cables): Tag number, i.e., LS01, on pair, then "+" on positive conductor. Use black for positive polarity and white for negative.
 - 6. Mark otherwise as specifically shown on the Drawings or Schedules.
- C. Method:
 - 1. Hot marked (embossed, not just surface printed) heat shrink tubing of the proper diameter; Raychem, or
 - 2. Typed or computer printed, wrap-on, cloth adhesive labels held in place with a length of clear heat shrinkable tubing, or
 - 3. Typed or computer printed, wrap-on labels held in place with a wrapped and heat bonded cover, 3M ScotchCode, or
 - 4. Engineer reviewed equivalent.
 - 5. Direct hot marking of wire or labeling methods, which depend solely on adhesive for attachment, are not acceptable.
- D. Location: Install wire markers at every connection point to terminal boards, control stations, indicators, starters, instruments, and similar equipment, and at all splices.

3.03 TAGGING

- A. Tag conductors and cables unless directed otherwise on the Drawings or Schedules.
- B. Text:
 - 1. Power and Control Circuits associated with MCC: MCC number and cubicle designation, such as MCC28-2BL.
 - 2. All lighting circuits and power circuits not associated with a motor control center (MCC): Panel designation and circuit number, such as, LP1-12, or PPA-23,25,27.

3. Lighting and power circuits from a panelboard furnished as an integral part of a MCC: Panel designation and circuit number, such as, LP1-12, or PPA-23, 25, 27.
 4. Control Circuits not associated with MCC: Name of equipment being controlled.
 5. Instrumentation: Tag number.
 6. Mark otherwise as specifically shown on the Drawings or Schedules.
- C. Method:
1. Loosely group conductors of same service. Use tie wraps to keep grouped.
 2. Install marking tag as specified in Section 26 05 53.
- D. Location: In pull boxes, handholes, manholes, and other enclosures where accessible but neither terminated nor spliced. It is not necessary to tag conductors in 4 by 4 or smaller boxes, or in conduit bodies.
- E. Mark the cover of 4x4 or smaller boxes with a permanent black felt tip marker to indicate wiring content as required in paragraph 3.03.B above.

3.04 INSTALLATION

- A. Install all wiring in conduit, except where specifically allowed otherwise on the Drawings.
- B. Bending Radii: Not less than permitted by ICEA or as recommended by cable manufacturer, whichever is greater.
- C. Splicing:
1. Power Circuits:
 - a. Splicing of THWN/THHN and XHHW-2 conductors is permissible in boxes, enclosures, handholes, manholes or similar accessible and protected locations.
 - b. Splicing in conduit bodies is not permitted.
 2. Control circuits and instrument wiring:
 - a. No splicing allowed.
 - b. If intermediate connections are required, provide enclosure and terminal block(s) where allowed by Engineer. Mark conductors as required above in this Section. Mark terminal boards as required in Section 26 27 27.
 3. Direct buried splices allowed only as shown on the Drawings or Schedules.
- D. Shields of TWSH:
1. Ground instrumentation cable shields at the PLC Cabinet.
 2. Cut shield at field end 1/2" shorter than cable pair(s). Install heat shrink tubing over shield to prevent contact with ground.

3.05 GROUNDING CONDUCTORS

- A. Grounding Electrodes/Grounding Electrode Conductors: Bare copper.

- B. Equipment Grounding Conductors: Insulated as required in 2.01, or as part of a cable. Bare copper where shown thus on the Drawings.

3.06 SCHEDULE (Not Used)

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. Furnish, install, connect, and test a complete grounding system for all non-current carrying conductive components and grounded circuit conductors of the wiring system, building structural steel, metallic piping, motor controls and panels, transformer neutrals and cases, motor frames, and other electrical systems and components.
- B. Where grounding systems are not shown on the Drawings, as a minimum, ground in accordance with the National Electronic Code (NEC).
- C. Where grounding systems are shown on the Drawings and are more stringent than required by the NEC, the Drawings take precedence.

1.02 SUBMITTALS

- A. Literature for electrolytic ground rods.

PART 2 PRODUCTS

2.01 GROUND RODS

- A. High carbon steel rod with minimum 0.01" thick electroplated copper coating.
- B. Minimum 5/8" diameter and minimum 10' long; provide larger if so scheduled or shown on the Drawings.
- C. Nehring Electrical Works Company NCC series (NCCS series for sectional rods) or Engineer approved equivalent.

2.02 ELECTROLYTIC GROUND RODS

- A. Manufacturer:
 - 1. Minimum 10 years' experience manufacturing electrolytic ground rods.
 - 2. International Organization for Standardization (ISO) 9002 certified.
- B. Ground Rod:
 - 1. Underwriters Laboratories (UL) listed.
 - 2. 100% self-activating / sealed and maintenance-free without addition of chemical or water solutions.

3. Operate by hygroscopically extracting moisture from the air to activate the electrolytic process improving performance.
4. 100% copper 2" nominal diameter hollow copper tube with a minimum wall thickness of 0.083".
5. Permanently capped on the top and bottom with air breather holes in the top of the tube and holes in the bottom of the tube for electrolyte drainage into the surrounding soil.
6. Factory filled with non-hazardous Calsolyte to enhance grounding performance.
7. 10' long unless shown otherwise by schedule or Drawings.
8. Provide a stranded 4/0 AWG Cu ground wire that is bonded to the side of rod by means of heavy-duty exothermic welding process.
9. 25-year manufacturer's warranty.
10. Lyncole XIT or Engineer approved substitution.

C. Backfill Material:

1. Provide manufacturer recommended quantity but minimum 50 pounds per rod.
2. Natural volcanic, non-corrosive form of clay grout backfill material free of polymer sealants, which absorbs approximately 14 gallons of water per 50 pound bag for optimal 30% solids density and which has a pH value of 8-10 with maximum resistivity of 3 ohm-m at 30% solids density.
3. Lynconite II or Engineer approved substitution.

2.03 GROUND ACCESS BOX

A. Composite Box:

1. For non-traffic applications only.
2. Provide snap-lock flush cover with "breather" holes.
3. Nominal 12" diameter by 10" high.
4. Lyncole model XB-12F or Engineer approved substitution.
5. Use only where specifically called for on Drawings.

B. Precast Concrete Access Box, Medium Traffic:

1. Slots for conduit entrances.
2. Minimum size 10" diameter by 12" high.
3. Round cast iron grate flush cover with "breather" slots.
4. Lyncole Model XB-12C or Engineer approved substitution.
5. Unless shown otherwise on the Drawings, use in dirt areas, in sidewalks, and in asphalt dust aprons.

C. Precast Concrete Access Box, Heavy Traffic:

1. Minimum 12" diameter by 10" high.
2. Cast iron frame with lifting sockets.
3. Triangular cast iron cover with breather holes.
4. Lyncole model XB-22 or Engineer approved equal.
5. Unless shown otherwise on the Drawings, use in driveways, parking lots, access aprons, alleys (paved or otherwise), private streets, and public streets.

2.04 GROUND CONDUCTORS AND TAPS

- A. Stranded soft-drawn bare copper.
- B. Conductor Size: NEC Article 250, unless shown larger on Drawings.

2.05 CONNECTIONS

- A. Use heavy duty exothermic welding process (HDEWP) or NEC/UL approved / listed compression connectors for all copper to copper grounding connections and for copper to ground rod connections.
- B. Use NEC / UL approved / listed compression connectors from copper conductor to structural reinforcing rod. Burndy Hyground Hygrid YGL-C or Figure 6 Hytap YGHP-C, or equal.
- C. Connection to power equipment (switchboard, MCC, panelboard, AFD, and similar): Install compression lugs on wire and bolt lugs to equipment ground bus.

PART 3 EXECUTION

3.01 CONDUIT AND RACEWAY SYSTEMS

- A. Conduit Systems at Panels and Boxes: Double locknuts with sealing-type locknut on outside. Use bonding jumpers for conduits installed in concentric or eccentric knockouts and between conduits installed at non-metallic boxes.
- B. Conduit Systems: Install a green insulated grounding conductor in all conduits for the length of the conduit. Size conductor in accordance with the NEC, as a minimum, unless otherwise specified on the Drawings. Use grounding bushing and connectors.
- C. Install a #4/0 (minimum) bare copper grounding conductor under all underground primary power duct banks. No grounding conductor is required in primary conduits.
- D. Install bare copper grounding conductors within or under other duct banks as shown on the Drawings.

3.02 SOLID GROUND RODS

- A. Install in firm soil outside of excavated areas.
- B. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
- C. Unless either excluded or shown otherwise on the Drawings, install access box at each rod. If box will have concrete cast adjacent to it, install 1/2" expansion material around box before pouring concrete. Set box flush with concrete surface.

- D. Depth:
 - 1. Where access box is installed, drive rod so top is 4" below finished grade.
 - 2. Where access box is not installed, drive rod so top is 24" below finished grade.

3.03 ELECTROLYTIC GROUND RODS

- A. Install according to manufacturer's instructions.
- B. Use for lightning protection grounds, whether specifically differentiated on the Drawings or not.
- C. Use for other grounds where shown on the Drawings.
- D. Install precast concrete access box at each rod. If box will have concrete cast adjacent to it, install 1/2" expansion material around box before pouring concrete. Set box flush with concrete surface.

3.04 STRUCTURE GROUNDING ELECTRODE SYSTEM

- A. Where shown on the Drawings, install bare copper grounding conductor in the concrete of the footing. Braze copper conductor to the tail of a reinforcing rod at minimum four places. Bond copper conductor to equipment where shown. Bond copper conductor to building structural steel columns, metallic piping, and similar, whether shown or not.

3.05 MARKING OF GROUND ACCESS BOXES

- A. If called for on the Drawings, mark each ground access box.
- B. Where an access box is surrounded by concrete, stamp the legend "GND" into the concrete adjacent to the box, minimum 1" high letters.
- C. Where an access box is surrounded by asphalt, pour a 20" x 6" x 12" deep concrete marker in a nearby non-traffic area with the legend "GND BOX XX FT" where XX is the distance between the marker and the box and an arrow pointing to the box, minimum 1" high characters.
- D. Where an access box is surrounded by dirt, pour a 6" x 6" x 12" concrete marker adjacent to it. Stamp the legend "GND" into the concrete, minimum 1" high letters.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Strut Systems.
- B. Supports.
- C. Anchors.

1.02 SUBMITTALS

- A. Information on materials and construction.
- B. Provide diagrams to show how installed.

PART 2 PRODUCTS

2.01 CORROSION RESISTANT METAL STRUT SYSTEM

- A. Channel:
 - 1. Designed with edges turned in, forming lips which allow special spring loaded nuts to be inserted anywhere along the channel.
 - 2. Material: 6063-T6 aluminum or 316L stainless steel.
- B. Spring Loaded Nut and Spring:
 - 1. Nut made of 316L stainless steel and designed to provide positive locking in place when tightened.
 - 2. Spring made of zinc chromate plated steel or stainless steel.
- C. Braces, brackets, and structural shapes used in the assembly of metal strut: 6063-T6 aluminum, 5052-H32 aluminum, or 316L stainless steel.
- D. Threaded Rod, Bolts, and Nuts: 316L stainless steel.
- E. All materials by the same manufacturer and designed as a system.

- F. Dimensions and Style:
 - 1. Single Strut: 1-5/8" by 1-5/8" – 12 gage, solid.
 - 2. Back-to-Back Strut: 1-5/8" x 3-1/4" – 12 gage, solid.
 - 3. As specifically noted otherwise on Drawings.
- G. Unistrut, B-Line, Superstrut, or Engineer reviewed equivalent.

2.02 FIBERGLASS STRUT SYSTEM

- A. Strut and Hanger Rod Construction: Linear glass strands, continuous mat laminates, and corrosion-resistant polyester resins simultaneously pultruded to form a uniform rigid thermoset shape.
- B. Fiberglass: Self-extinguishing with Underwriters Laboratories (UL) 94 V-O classification.
- C. Hanger Rod Washers: Stamped from pultruded flat stock.
- D. Hanger Rod Square Nuts: Made from pultruded flat stock.
- E. Hanger Rod Hex Nuts and Strut Nuts: Injection molded.
- F. Hanger Rod Beam Clamps and Pipe Straps: Steel, with 15 mil polyvinyl chloride (PVC) coating and SS bolts.
- G. Deflection Versus Loading and Recommended Loading: Equal to or better than that of Rob Roy Industries Rob-Glass Fiberglass Strut Support System.
- H. Single Strut: 1.715 by 1.76 by 0.15 wall by length.
- I. Back-to-Back Strut: 1.715 by 3.52 by 0.15 wall by length.

2.03 METAL STRUT SYSTEM

- A. Same as Paragraph 2.01 except galvanized or painted steel.
- B. Hardware: Zinc or cadmium plated.

2.04 ANCHORS

- A. Comply with the requirements of Division 5, specifically with Section 05 50 01 – Anchor Bolts and Chemical Anchors. Lead shields with lag bolts: not acceptable. Concrete Tapping Screws: Not acceptable.

- B. Anchors Placed in Poured Concrete: Stainless steel expansion bolts, such as Hilti, Wejit, or equal, or chemical anchors.
- C. Anchors Placed in Concrete Masonry Units:
 - 1. Chemical anchors.
 - 2. Toggle bolts may be used in hollow portions of concrete masonry units in Non-Process Indoor Areas.

PART 3 EXECUTION

3.01 ANCHORS

- A. Comply with the installation requirements of Section 05 50 01 – Anchor Bolts and Chemical Anchors.

3.02 SUPPORT OF ALUMINUM CONDUIT AND BOXES

- A. Support with stainless steel bolts, washers, and nuts and aluminum clamps, plates, angles, and/or strut.

3.03 SUPPORT OF OTHER CONDUIT AND BOXES

- A. Support with stainless steel bolts, threaded rod, washers, and nuts and stainless steel clamps, plates, angles and / or stainless steel strut.
- B. As allowed in Paragraph 3.05.

3.04 FLEXIBLE STRAP

- A. Flexible steel and / or copper perforated straps (such as plumber's tape) are not acceptable for support of any electrical item.

3.05 USAGE OF STRUT

- 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.
- E. Unless specifically allowed otherwise on Drawings, use painted Metal Strut Systems (Paragraph 2.03), only in Non-Process Indoor Areas.
- F. Unless specifically allowed otherwise on Drawings, use galvanized Metal Strut

Systems (Paragraph 2.03), only in Non-Process Indoor Areas, and in indoor spaces in which liquid sewage or sludge is not handled, such as a blower room.

END OF SECTION

SECTION 26 05 33.13

ELECTRICAL CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Conduit and accessories.

1.02 SUBMITTALS (NOT REQUIRED)

PART 2 PRODUCTS

2.01 RIGID METAL CONDUIT (RMC)

- A. Steel RMC:
 - 1. Meet National Electronic Code (NEC) 344 and American National Standards Institute (ANSI) C80.1.
 - 2. Listed and labeled under Underwriters Laboratory (UL) 6 or Canadian Standards Association (CSA) recognized.
 - 3. Electro-galvanized on outside, inside, and on threads.
- B. Aluminum RMC:
 - 1. Meet NEC 346, UL 6, and ANSI C80.5.
 - 2. Listed and labeled under UL6 or CSA recognized.

2.02 POLYVINYL CHLORIDE COATED RIGID METAL CONDUIT (PVC RMC)

- A. Standards:
 - 1. Comply with NEC 344, UL 6, and ANSI C80.1.
 - 2. Electronic Testing Laboratories (ETL) Verified to meet Intertek ETL SEMKO High Temperature Water polyvinyl chloride (PVC) Coating Adhesion Test Procedure, or successfully tested by UL for PVC adhesion after 240 hours at 100°C in an air-circulating oven and 600 hours of salt spray (fog) exposure in accordance with American Society for Testing and Materials (ASTM) B 117-94.
 - 3. Each length of conduit shall bear the ETL Verification Mark "ETL Verified to PVC-001" and a UL6 label.
- B. Steel Conduit: Threaded, then hot-dip galvanized inside, outside, and on the threads, then coated inside, outside, and on the threads.
- C. External PVC Coating:
 - 1. 0.035" to 0.045" thick polyvinyl chloride on the full length of the exterior of the conduit except on the threads.
 - 2. Comply with NEMA RN 1 – Type A.
 - 3. Minimum strength of bond between galvanized steel and PVC coating: 3500 PSI.

- D. External Urethane Coating:
 - 1. Minimum 2 mil thickness of clear two-part urethane.
 - 2. Apply on threads, overlapping the PVC coating and the inner coating.
- E. Internal Urethane Coating:
 - 1. Minimum 2 mil thickness of colored two-part urethane.
 - 2. Finished Coating: Sufficiently flexible so it does not peel or crack when bends are made in the conduit.
 - 3. Apply on the full length of the interior of the conduit.
- F. Boxes and Fittings:
 - 1. Listed and labeled under UL514B.
 - 2. Same materials as the conduit.
 - 3. Coated on the exterior, interior, and threads the same as the conduit.
- G. Boxes, Fitting, and Sealing Fittings for Hazardous Locations:
 - 1. Listed under UL886.
 - 2. Same materials as the conduit.
 - 3. Coated on the exterior, interior, and threads the same as the conduit.
 - 4. Provide gas seals which are designed and manufactured so the total allowable fill in the gas seal is not less than the total allowable fill in the conduit.
- H. PVC and Urethane Coating Repair Materials: By the conduit manufacturer.
- I. Provide manufacturer's warranty that the conduit and fittings are free from defects in material and workmanship. Length of Warranty: 5 years from the date of shipment from the manufacturer's plant or 3 years from the date the installation is certified, whichever occurs last.
- J. Perma-Cote, Robroy, Ocal, or Engineer reviewed equivalent.

2.03 RIGID NONMETALLIC CONDUIT (RNC)

- A. Might be referred to as "RNMC" on the Drawings.
- B. Meet NEC 352 and National Electrical Manufacturers Association (NEMA) TC2.
- C. Listed / labeled under UL 651 for use with conductors operating at 90°C.
- D. Ultraviolet (UV) resistant.
- E. Schedule 40 PVC Except Schedule 80:
 - 1. Where called for in the Schedule.
 - 2. Where installed exposed, or
 - 3. Where called for on Drawings.

- F. Glue all Joints Except:
 1. Provide bell and spigot expansion joint with O-rings where required for expansion / contraction, and
 2. Provide glue to thread fittings for transition to threaded conduit systems.
- G. Fittings and Cement: By conduit manufacturer.
- H. Carlon Plus 40 (Plus 80), or Engineer reviewed equivalent.

2.04 FIBERGLASS – REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Meet NEC 355 and NEMA TC14.
- B. Listed / labeled under UL 2420 (below grade) and UL 2515 (above grade).
- C. Manufacturing Process:
 1. Manufactured using a single circuit filament winding process.
 2. Winding mandrels shall be straight and true as to produce non-tapered conduits.
 3. Epoxy based resin system with no fillers, using an anhydride curing agent.
 4. Fiberglass shall consist of continuous E-glass Grade “A” roving.
 5. Curing using two step oven heated process.
 6. Interior conduit body walls shall be smooth and all fibers embedded in the epoxy.
- D. Mechanical Characteristics:
 1. Tensile Strength: 11,000 psi (ASTM D2105).
 2. Compression Strength: 12,000 psi (ASTM D695).
 3. Impact Resistance: ASTM D2444.

| MINIMUM IMPACT RESISTANCE AT 0°C | | |
|----------------------------------|----------------------|-------------------|
| SIZE (INCHES) | STANDARD WALL FT-LBS | HEAVY WALL FT-LBS |
| 0.75 | 20 | 150 |
| 1 | 25 | 400 |
| 1.5 | 35 | 500 |
| 2 | 40 | 550 |
| 2.5 | 55 | 600 |
| 3 | 70 | 700 |
| 3.5 | 80 | 850 |
| 4 | 120 | 1,000 |
| 5 | 160 | 1,200 |
| 6 | 200 | 1,300 |

E. Minimum Wall Thickness:

| SIZE (INCHES) | STANDARD WALL – WALL THICKNESS (INCH) | HEAVY WALL – WALL THICKNESS (INCH) |
|---------------|---------------------------------------|------------------------------------|
| 0.75 | .070 | .25 |
| 1 | .070 | .25 |
| 1.5 | .070 | .25 |
| 2 | .070 | .25 |
| 2.5 | .070 | .25 |
| 3 | .070 | .25 |
| 3.5 | .070 | .25 |
| 4 | .096 | .25 |
| 5 | .096 | .25 |
| 6 | .096 | .25 |

- F. Couple by means of bell and spigot with triple seal gasket or with glued couplers. Glued couplers required when there is no interference joint (e.g. after a field cut).
- G. Elbows: Factory formed.
- H. Factory assemble couplers onto conduit where adapting to different conduit types.
- I. Two-Part Epoxy: Provided by manufacturer of conduit.
- J. Champion Fiberglass or Engineer reviewed equivalent.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Meet NEC 358. Listed / labeled under UL 797.
- B. Connectors and Couplings:
 1. Steel, not die-cast.
 2. Rain-tight compression type, T&B TC11xA or equivalent.
 3. Neither set screw nor indenter type will be acceptable.

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Meet NEC 348. Listed / labeled under UL 1.
- B. Steel.
- C. Use a single piece for each run. Do not use couplings.
- D. Connectors: Steel squeeze type, Appleton Catalog Numbers 7480 through 7490, or Engineer reviewed equivalent.

2.07 LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

- A. Meet NEC 350.
- B. Listed / labeled under UL 360 for use in ambient temperatures from -30°C to $+80^{\circ}\text{C}$, wet.
- C. Galvanized steel with UV resistant PVC jacket.
- D. Use a single piece for each run. Do not use couplings.
- E. Connectors: Appleton ASTM series or Engineer reviewed equivalent.

2.08 LIQUID-TIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Conform to NEC 356.
- B. Listed / labeled under UL 1660 for use in ambient temperatures up to $+80^{\circ}\text{C}$, dry; $+60^{\circ}\text{C}$, wet.
- C. Sunlight resistant.
- D. Use a single piece for each run. Do not use couplers.
- E. Connectors: Appleton ASTM series or Engineer reviewed equivalent.

2.09 OTHER CONDUITS

- A. Meet requirements of appropriate NEC article and applicable UL standard.
- B. Use only after specific written approval of the Engineer.

2.10 CABLE CONNECTOR

- A. Aluminum liquid tight, strain relief type, T & B 29XXSST series.
- B. Where installed through enclosure wall, also use sealing ring with SS retainer, T & B 5262 series.

PART 3 EXECUTION

3.01 CONDUITS REQUIRED

- A. Many conduits and associated conductors are not shown or are only partially shown on plan views in the Drawings. Install as if fully shown.
- B. In addition to conduits that are shown on plan views in the Drawings:
 - 1. Install conduits as shown in any conduit schedules. If schedules are used, they are appended to this Specification or are included on the Drawings.

2. An entry in a conduit schedule requires conduits and conductors end-to-end, complete. For example, there is only one entry for a given motor feeder, even though there is actually one conduit and set of conductors shown from the starter to the local disconnect switch and another from the disconnect switch to the motor.
3. Install as implied for circuiting, such as where a panelboard circuit number is shown adjacent to a wiring device, and from switches to associated luminaires.
4. Install as called for in panelboard schedules.
5. Install as called for in tables shown as part of schematic diagrams.
6. Install as required for control of process equipment. Pay special attention where recommendations of the manufacturer of the process equipment supplied differ from that shown in the design.
7. Install as required for a complete system.
8. Install as called for on the One-Line Diagram.

3.02 INSTALLATION

- A. Conduit Bends:
 1. Factory made or made with a conduit bending machine recommended by the conduit manufacturer.
 2. If EMT is specifically allowed in the matrix of conduit usage then bends in EMT may be made with a hand bender which fully supports the side walls.
- B. Wrench tighten all threaded joints, couplings, fittings, and connectors.
- C. Run conduits concealed in finished areas and where indicated on the Drawings. In many places, such as at motors and surface-mounted wiring devices in pump rooms and electrical rooms, the end of a run may be an exposed vertical riser even though the symbol used for the conduit denotes concealed.
- D. Run exposed conduit either parallel with or perpendicular to structural members of the building or structure except where allowed otherwise by the Engineer.
- E. The only conduit that may be above a roof is conduit that serves equipment on that roof. Locate roof penetrations so no horizontal runs of conduit are required on the roof.
- F. Conduit installed above lay-in ceilings will be considered to be concealed, and need not comply with parallel / perpendicular requirements for exposed conduit. Route to avoid interference with piping, duct work, and luminaries. Locate conduit well above the lay-in ceiling. Support independently of ceiling suspension wires.
- G. Do not install conduit on slabs, decks, sidewalks or floors where it may create a trip hazard. The Engineer or Owner judges what conditions are "trip hazards". Conduits may be installed on slabs only with written permission from the Engineer or Owner.
- H. Drainage: Avoid pockets in conduit runs. Provide suitable drainage fittings in low spots in exposed conduit. Weep holes not permitted.

- I. Field Cuts and Threads:
 - 1. Cut ends of conduit square. Ream to remove burrs and sharp edges.
 - 2. Non-Factory Threads: Same effective length, thread dimensions, and taper as factory cut threads.
 - 3. Carefully remove burrs from threads.
 - 4. For steel RMC, paint conduit threads with vinyl repair compound, same as used for PVC RMC.

- J. Supports:
 - 1. Comply with NEC and Section 26 05 29 – Hangers and Supports.
 - 2. In horizontal conduits runs install one-hole conduit straps with the anchor below the conduit.

- K. Conduit Ends:
 - 1. Where conduits terminate in hand holes, manholes, trenches, floor cavities, or similar, or through concrete into open-bottom enclosures plug spaces between conductors / cables and conduit with duct seal.
 - 2. Protect conduit ends during construction to prevent entrance of foreign material.
 - 3. Install insulated throat grounding bushing on conduit ends and install bonds as specified in Section 26 05 26 – Grounding and Bonding, and as required by the NEC.
 - 4. Where conduits enter an enclosure from underground, whether through concrete or from earth (such as in a transformer), set end of conduit at 2-3" above the surrounding or nearby concrete.

- L. Clean and swab inside by mechanical means to remove foreign materials and moisture before wires or cables are installed, also for spare conduits.

- M. Spare Conduits:
 - 1. Blow a pull string through the conduit.
 - 2. If end is buried or exposed to weather, glue pull string to inside of cap with silicone seal, let set, leave adequate slack, then install cap.
 - 3. Where not exposed to weather, seal conduit end with duct seal.

- N. Use anti-seize compound on threads of aluminum RMC.

- O. Conduit and Boxes Installed on Guard Rails:
 - 1. Allowed only where shown on the Drawings or where specifically proposed in writing by the Contractor and approved by the Engineer.
 - 2. If allowed for conduits, mount on the outside of the rail (opposite from the walking surface).
 - 3. If allowed for enclosures, install strut on the outside of the rail then extend upward to support enclosures.
 - 4. Where guard rail is removable, provided with a gap and chains, or has a gate, run conduit on the side of the bridge, below the level of the walking surface.

- P. Where shown on Drawings, provide sleeves for conduit penetrations. Where the penetration is through the wall of a process structure which contains water, provide mechanical “link-seals” between the inside of the sleeve and the outside of the conduit. Seal other penetrations with 40-year rated silicone seal.
- Q. Requirements where conduits enter / exit a structure / building below grade:
1. Do not run conduits in / through footings.
 2. Bury conduits larger than 2" trade size minimum 12" below the bottom of the footing.
 3. Fewer than five conduits of 2" trade size or less in a loose grouping may penetrate the stem wall.
 4. More than five conduits of any size in a grouping:
 - a. Bury minimum 12" below the bottom of the footing or
 - b. Submit structural details of block-outs and reinforcing through the stem wall for review by the Engineer. After conduits are installed through a block-out, fill the remaining space with non-exothermic, non-shrink grout.
- R. Expansion Joints: Where conduit spans building expansion joints or in long duct runs, use expansion fittings and bonding jumpers.

3.03 INSTALLATION OF PVC RMC

- A. Comply with installation requirements of Paragraph 3.02. In addition, comply with the requirements of Paragraph 3.03.
- B. Obtain training and certification of installers of PVC RMC from the manufacturer and use only installers who are trained and certified and whose records are on file with the Engineer, all specifically for this project.
- C. Use special bending tools, vise jaws, pliers, wrenches, drivers, and other tools designed for working with PVC RMC to eliminate damage to the PVC coating.
- D. Repair external coating where damaged. Apply coating repair liquid in multiple coats so the thickness of the coating at the entire damaged area is minimum 80 mils.
- E. Paint all metal surfaces exposed by field cutting and / or threading with colored two-part urethane and allow to dry before installing conduit.
- F. Paint male threads with coating repair liquid immediately prior to installation of a fitting or coupling.
- G. During installation, seal PVC to PVC at the joints with coating repair liquid.
- H. The requirements of the above five paragraphs are minimum requirements, even if more stringent than the recommendations of the manufacturer. If portions of the recommendations of the manufacturer are more stringent than the above, follow those as well. Bring objections of the conduit manufacturer (if any) to the Engineer for resolution.

- I. Furnish the services of an authorized representative of the conduit manufacturer to inspect the finished installation.
 1. If the representative cites installation problems then rectify the problems.
 2. When the representative finds the installation to be at least in accordance with the manufacturer's recommendation, then obtain from the representative and furnish to the Owner a certification from the conduit manufacturer that the installation conforms to the manufacturer's recommendations and that the Manufacturer's Warranty is in effect.
 3. If during the warranty period any material or the installation of any material is defective, replace or repair such material as mutually agreed between the Owner and the Contractor. Replacement or repair operations shall not adversely affect the warranty.

3.04 INSTALLATION OF RTRC

- A. Comply with installation requirements of Paragraph 3.02.
- B. Obtain training and certification of installers of RTRC from the manufacturer and use only installers who are trained and certified and whose records are on file with the Engineer, all specifically for this project.
- C. Use special tools designed for working with RTRC.
- D. Where installed below grade or embedded in concrete, use only Heavy Wall RTRC for sweeps, 90's, and transitions in and out of concrete.
- E. Where installed in a Class I Division 2 location, for below grade elbow elbows, and where penetrating a concrete slab, only Heavy Wall RTRC shall be used. All other locations Standard Wall is acceptable, except if noted otherwise in the Schedule or on the Drawings.
- F. Where installed in Class 1 Division 2 locations, if in the Schedule, or were required on the Drawings, furnish the services of an authorized representative of the conduit manufacturer to inspect the finished installation.
 1. If the representative cites installation problems then rectify the problems.
 2. When the representative finds the installation to be at least in accordance with the manufacturer's recommendation, then obtain from the representative and furnish to the Owner a certification from the conduit manufacturer that the installation conforms to the manufacturer's recommendations.
 3. If during the warranty period any material or the installation of any material is defective, replace or repair such material as mutually agreed between the Owner and the Contractor. Replacement or repair operations shall not adversely affect the warranty.

3.05 DUCT BANKS

- A. Where duct bank is shown on the Drawings, encase conduits in 4000 PSI concrete. Comply with the requirements of Division 2 for earthwork and of Division 3 for concrete.
- B. Drawings show known interferences, but others may exist. Where close to known interferences or where evidence of other interferences is found in the field, hand excavate trench.
- C. Install conduits using plastic spacers. Provide spacers maximum of 8' on center, but closer where so shown in the conduit manufacturer's instructions or where required for adequate support at elbows, offsets, or sweeps.
- D. Remove mud and other foreign substances from conduits before pouring of concrete.
- E. Provide minimum 3" of concrete all around the outside of conduits. Provide minimum 3" of concrete between walls of adjacent conduits.
- F. To prevent floating, tie down duct banks with reinforcing bars and steel wire before pouring concrete.
- G. Dye all concrete red. Use 7-8 pounds of Bayferrox CC16 Red dye, or Engineer reviewed equivalent, per cubic yard of concrete mix.
- H. Prevent loose dirt from falling into trench during concrete pouring operations.
- I. Pour each section, i.e. riser to riser, riser to pull box, pull box to pull box, etc., of duct in one operation. If such construction is not feasible, construction joints will be permitted, subject to review of Engineer, provided 40 mil PVC RMC is used a minimum of 5' on both sides of joint, and minimum 4 #4 by 10' reinforcing bars are run through the joint.
- J. Make sure that concrete flows all around all conduits by suitable means, except do not use mechanical concrete vibrators and do not significantly displace conduits.
- K. Duct bank concrete may be poured without forming, provided trench walls are firm and do not cave; otherwise, use forms as specified in Division 3.
- L. After construction of duct banks is complete, pull a mandrel through each duct. Use a mandrel 1/4" smaller in diameter than duct unless the manufacturer recommends otherwise. If any obstructions are encountered or if there is evidence of water pocket in duct, locate, remove and replace that section at no cost to Owner.
- M. Where shown on the Drawings, install bare copper ground wire under or in concrete of duct bank. Connect to ground conductors / ground bars at each end.

3.06 APPLICATION

A. RMC:

1. Steel RMC is not permitted direct buried.
2. Aluminum RMC is Not Permitted:
 - a. In contact with earth.
 - b. Embedded in concrete.
 - c. In contact with concrete below grade, outdoors, or in wet indoor locations.

B. PVC RMC:

1. Permitted in areas subject to corrosive environment.
2. Permitted underground, direct buried.
3. Use where required by other paragraphs of this Section or other Sections.
4. Permitted for elbows in larger size underground installations of RNC.
5. Use for all penetrations of slabs except:
 - a. Where a run of RNC comes into the bottom of an enclosure having an open bottom, such as an motor control center (MCC).
 - b. Where the upward continuation of a run is anchored to a block or poured concrete wall directly and close above the penetration.
 - c. Where the upward continuation of a run will be hidden within a wall.
 - d. Where Heavy Wall RTRC is used to penetrate a slab.

C. RNC:

1. Do not use where exposed to direct sunlight.
2. Permitted underground or direct buried.
3. Do not use RNC elbows for underground installations with conduit sizes 2" or greater. Elbows may be RTRC or PVC RMC.

D. RTRC:

1. Permitted in areas subject to corrosive environment.
2. Permitted underground, direct buried.
3. Permitted for elbows in larger size underground installations of RNC.
4. Use where required by other paragraphs of this Section or other Sections.

E. EMT:

1. Use only where shown in the matrix of conduit usage.

F. Flexible Conduits:

1. Use for final connection to luminaires, motors, dry type transformers, heating, ventilation, and air conditioning (HVAC) equipment, water heaters, unit heaters, and similar applications.
2. Do not install within a wall or slab. Do not install as / in a penetration of a wall or slab.
3. Do not install in lengths of more than 18" except:
 - a. For connection of lay-in luminaries.

- b. For connection of equipment where Operation and Maintenance (O&M) manual recommends moving it for maintenance, such as certain models of uninterruptible power supply systems.
 - c. For connection of adjustable frequency drives.
 - d. Where proposed in writing case-by-case by the Contractor and specifically allowed by the Engineer. No other exceptions to length restrictions.
- 4. LFMC and LFNC: Allowed as a factory component of luminaires and / or process equipment.
 - 5. FMC: Allowed as a factory component of luminaries.
 - 6. Use FMC for connections to adjustable equipment and devices in air ducts or plenums.
- G. All Conduits:
- 1. Use type specifically called for on the matrix of conduit usage. If not shown in the matrix of conduit usage, comply with requirements shown on the Drawings. If not shown in either the matrix of conduit usage or on the Drawings, refer to the matrix of conduit usage for all other work.
 - 2. No plastic conduit allowed above lay-in ceilings where the cavity functions as an air-handling plenum, regardless of matrix of conduit usage.
 - 3. Do not install exposed conduits in finished areas, such as laboratories, offices, training rooms, and similar. Clarify any questionable area with the Engineer in the field before installing.
- H. Matrix of Conduit Usage:
- 1. A matrix of conduit usage may be shown on the Drawings.
 - 2. If multiple columns are marked, any marked type is allowed subject to NEC restrictions and restrictions above, such as but not limited to those concerning buried conduits, elbows, penetrations, exposed installation, and use in cavities.
 - 3. Different parts of a run may be of different type conduit, such as where a flexible connection is required.
 - 4. If a column is marked "C" then use only where concealed in a wall or above a gypsum board or lay-in ceiling.
 - 5. If a column is marked "CA" then use only above a gypsum board or lay-in ceiling.
 - 6. If a column is marked "E" then use only for connections between electrical supply and control equipment, not for connection of utilization equipment and not for connection of field devices such as flow transmitters and hand switches. A marking of "E" is typically intended to be limited to electrical rooms.
 - 7. If a column is marked "H" then use only above 6' or directly above equipment where not subject to damage.
 - 8. See matrix of conduit usage for other column marking notes.
 - 9. Where the matrix of conduit usage shows RNC for outdoor use, it is allowed only where protected from direct sun exposure, such as under a bridge or under a digester cover.

END OF SECTION

SECTION 26 22 13.10

LOW-VOLTAGE DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Low voltage transformers dry type transformers for general lighting and power service.

1.02 SUBMITTALS

- A. Complete manufacturer's catalog cuts with ratings.

PART 2 PRODUCTS

2.01 DRY TYPE TRANSFORMERS

- A. UL Listed/Labeled two-winding dry type transformers with voltage, phases, and kVA ratings as shown on Drawings or Schedule.
- B. Copper windings.
- C. Connection: Furnish three phase transformers with delta connection on higher voltage windings and wye connection on lower voltage windings.
- D. Maximum design temperature rise over 40°C ambient:
 - 1. Single phase:
 - a. 2 kVA and less - 80°C.
 - b. 3 kVA through 25 kVA - 115°C.
 - c. Greater than 25 kVA - 150°C.
 - 2. Three phase:
 - a. 45 kVA and less - 115°C.
 - b. Greater than 45 kVA - 150°C.
- E. Furnish transformers rated 30 kVA and less with core and coil resin encapsulated suitable for indoor or outdoor use.
- F. Furnish transformers rated greater than 30 kVA with ventilated enclosure rated NEMA 1 where installed indoors or NEMA 3R where outdoors.
- G. Minimum taps required:
 - 1. Transformers rated 3 kVA or less: No taps.
 - 2. Transformers rated greater than 3 kVA through 30 kVA: Two 2 1/2 % full capacity above normal (FCAN) and two 2 1/2% full capacity below normal (FCBN) taps.

3. Transformers rated greater than 30 kVA: Two 2 1/2% full capacity above normal (FCAN) and four 2 1/2% full capacity below normal (FCBN) taps.
- H. Furnish transformers with different or other features as shown on Drawings or Schedule, such as but not limited to aluminum windings, different winding connections, additional taps.
- I. Transformers which fall within the scope of the Guide for Determining Energy Efficiency for Distribution Transformers, published by the National Electrical Manufacturers Association® (NEMA® TP-1-2002): Meet Class I Efficiency Levels for distribution transformers specified in Table 4-2 of the Guide.
- J. Cutler-Hammer type EP and DS-3 single phase or type EPT and DT-3 three phase, General Electric type QB, QMS, and QL single phase and type QMS3 and QL three phase, Square D Class 7400, or Engineer reviewed equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install transformer plumb and level.
- B. Provide clearance around transformer for access and ventilation as recommended by manufacturer.
- C. Use flexible conduit for connections to transformer case. Make conduit connections to transformer enclosure only at locations designated by the manufacturer's installation instructions.
- D. After normal operating load have been energized, measure secondary voltages and adjust tap settings as necessary. Record tap settings on record drawings.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Panelboards.

1.02 SUBMITTALS

- A. Summary Sheet showing:
 1. Voltage, phases, and main bus ampacity.
 2. MLO panels: Type of main lugs.
 3. MCB panels: Main breaker rating.
 4. Neutral and ground bar ratings.
 5. Bus material and plating.
 6. Short circuit rating.
 7. Flush or surface mount, enclosure NEMA type, and trim details.
 8. Rating and arrangement of branch circuit breakers.
 9. Description of specified factory assembled modification including, but not limited to, sub-feed breakers, sub-feed lugs, feed-through lugs, and metering transformers.
- B. Panelboard layout showing all circuit breakers, strapping and mounting hardware for future circuit breakers, and space for future strapping and mounting hardware.
- C. If the submitted circuit breaker layout differs from the Drawings then demonstrate that the phase current balance will be substantially the same.

1.03 OPERATIONS AND MAINTENANCE DATA

- A. As-built layout drawing showing location, ampacity, and poles of each breaker.
- B. Copies of all directories.
- C. Settings used for electronic trip units and ground fault relays.

1.04 QUALITY ASSURANCE

- A. Conform to the following:
 1. UL 50 Enclosures for Electrical Equipment.
 2. UL 67 Panelboards.
 3. NFPA 70 National Electrical Code.
 4. NEMA PB1 Panelboards.
 5. UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures".

6. NEMA AB1, "Molded Case Circuit Breakers".

PART 2 PRODUCTS

2.01 PANELBOARDS – COMMON REQUIREMENTS

- A. Voltage, phases, and current ratings as shown on Drawings.
- B. Minimum branch circuit breaker space as shown on Drawings.
- C. Minimum Box Width:
 - 1. 14 inches for:
 - a. 100 amp, single phase, flush mounted.
 - b. 100 amp, 208Y/120 volt, three phase, flush mounted.
 - 2. 20 inches for all others.
- D. Main circuit breaker (MCB) or main lugs only (MLO) as shown on Drawings.
- E. Bus: Tin plated aluminum unless shown otherwise on the Drawings or Schedule.
- F. Ground Bar: Furnish all panelboards with a ground bar having a screw for each pole.
- G. Neutral Bar:
 - 1. 208Y/120 volt and 120/240 volt single phase panelboards: Provide 100 percent neutral bar with a screw for each pole unless shown otherwise on the Drawings or Schedules.
 - 2. 480Y/277 volt panelboards which are used as service equipment: Provide 100 percent neutral bar.
 - 3. 480Y/277 volt panelboards which power 277 volt loads, such as site lighting and UV systems, and elsewhere required on the Drawings: Provide 100 percent neutral bar with a screw for each pole.
 - 4. 480 volt panelboards which power no 277 volt loads: No neutral bar required.
- H. Furnish sub-feed breakers, sub-feed lugs, feed-through lugs or other factory options as shown on Drawings.
- I. Flush or surface mount as shown on Drawings.
- J. Listed and labeled for service entrance use if used for service entrance equipment or so indicated on Drawings.
- K. Circuit Breakers:
 - 1. Furnish circuit breakers recommended by the manufacturer of the panelboard for use in the panelboard furnished.
 - 2. Provide as shown on Drawings or Schedules.
- L. Furnish all required strapping and mounting hardware required for the future installation of a circuit breaker of the frame size shown where "FUTURE" is shown

on the Drawings or Schedules.

- M. Furnish a panelboard with the required space for the future installation of strapping, mounting hardware, and circuit breakers where “SPACE” is shown on the Drawings or Schedules.”
- N. Circuit Breaker Mounting and Connection:
 - 1. Connection between line side of circuit breaker and bus by direct bolted connection, or
 - 2. Connection between line side of circuit breaker and bus by spring tension jaws designed to produce increased contact pressure under fault conditions and entire circuit breaker secured in place with bolt, and
 - 3. No restriction on ability to mount circuit breakers of different frame size or number of poles opposite each other.
- O. Manufacturers and Types:
 - 1. Cutler-Hammer: Pow-R-Line 1 and Pow-R-Line 2.
 - 2. General Electric: AQ, AE, and AD.
 - 3. Square D: NQOD and NF.
 - 4. Engineer reviewed equivalent.

2.02 ENCLOSURE AND TRIM

- A. Enclosure rated NEMA 1, NEMA 3R, NEMA 4, NEMA4X SS or NEMA 12 as shown on Drawings or Schedules.
- B. Enclosure constructed of zinc-coated sheet steel for all but NEMA4X SS.
- C. For NEMA 3R, 4, and 12, provide enclosure with exterior surfaces prepared, primed and painted in a light grey, ANSI 49 or similar color, at the factory.
- D. Flush mounted 208Y/120 volt and 120/240 volt single phase panelboards rated 100A: Furnish with decorative trim fastened to the box on four sides with screws or screwdriver operable captive latches and a hinged and latched door to cover access to circuit breaker operating handles but without access to any energized parts.
- E. Flush mounted 208Y/120 volt and 120/240 volt single phase panelboards rated greater than 100A and all flush mounted 480 volt panelboards: Furnish “door-in-door” trim.
 - 1. Inner door with hinges and latch to cover access to circuit breaker operating handles but without access to any energized parts.
 - 2. Outer door hinged on one side and secured on remaining sides with captive screws or screw driver operated latches. Provide door that provides full access to wiring gutter on all four sides when open.
 - 3. Provide decorative trim around box to cover the gap between the enclosure and the wall surface.
 - 4. Provide trim prepared, primed and painted in a light grey, ANSI 49 or similar color, at the factory.

- F. Furnish Surface Mounted Panelboards with “Hinged Trim” Cover:
 1. Inner door with hinges and latch to cover access to circuit breaker operating handles but without access to any energized parts.
 2. Trim hinged at one edge of box and secured on remaining sides with captive screws or screw driver operated latches. Provide door that provides full access to wiring gutter on all four sides when open.
 3. Provide trim prepared, primed and painted in a light grey, ANSI 49 or similar color, at the factory.
- G. Furnish latched and lockable door with metal frame cardholder with clear plastic window on inside of door for panel directory.
- H. Provide other features as shown on the Drawings or Schedules.

2.03 OVERCURRENT PROTECTIVE DEVICES

- A. General: Provide circuit breakers as integral components of panelboard with indicated features, ratings, characteristics, and settings.
- B. Future Devices: Equip compartments with mounting brackets, supports, bus connections and necessary appurtenances for future circuit breakers as show on the Drawings or Schedules.
- C. Molded-Case Circuit Breakers:
 1. General: UL489, “Molded Case Circuit Breakers and Circuit Breaker Enclosures,” and NEMA AB 1, “Molded Case Circuit Breakers.”
 2. Suitable for use with conductors operating at 75° C.
 3. Characteristics: Frame size, trip rating, number of poles, and short-circuit interrupting capacity rating as shown on the Drawings or Schedules.
 4. Interrupting capacity not less than shown on the Drawings or Schedules. Furnish all circuit breakers with full interrupting capacity. Do not use series ratings.
 5. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous over-current trip protection for each pole.
 6. Adjustable instantaneous trip devices: Front adjustable; factory adjusted to low trip setting.
 7. Solid state trip devices: When called for on the Drawings, provide molded case circuit breakers that use solid-state trip devices.
 8. Furnish circuit breakers for lighting circuits that are switching duty rated.
 9. Furnish heating, air conditioning, refrigeration (HACR) rated circuit breakers when called for on the Drawings or Schedules.
 10. Furnish single pole circuit breakers with ground fault interrupting capability when called for on the Drawings or Schedules. When required furnish Class A (6ma.) or Class B (30ma.) as shown on the Drawings or Schedules.
- D. Electronic Circuit Breaker Trip Devices: True RMS sensing, microprocessor based, solid-state overcurrent trip device system that includes one or more integrally

mounted current transformer or sensor per phase, a release mechanism, and the following features:

1. Temperature compensation to assure accuracy and calibration stability from minus 20 degree C. to plus 55 degree C.
2. Time-current tripping functions, field adjustable with the breaker closed and energized, as scheduled or shown on the Drawings, often abbreviated as L, S, I, and G.
 - a. Adjustable long-time pick-up current.
 - b. Adjustable long-time-delay.
 - c. Adjustable short-time pick-up current.
 - d. Adjustable short-time-delay.
 - e. Adjustable instantaneous trip current.
 - f. Adjustable ground-fault pick-up current.
 - g. Adjustable ground-fault-delay.
 - h. Selectable I2t function on short-time-delay.
 - i. Selectable I2t function on ground-fault-delay.
3. Clear, sealable cover over adjustments.
4. Other factory options as shown on the Drawings or Schedules.
5. Trip Indication: Labeled lights or mechanical indicators indicating long-time overload, short-time overload, instantaneous, or ground fault as cause of trip. If lights are used, furnish with integral power source capable of maintaining indication for not less than 48 hours.
6. Arrangement to permit testing of all functions without removal from panelboard and to permit viewing and adjustment of all functions without removal of any metal panels.
7. Furnish 80 percent rated circuit breakers unless otherwise shown on the Drawings or Schedules.

E. Ground Fault Protection Systems: If and as indicated on the Drawings or Schedules, provide zone selectively interlocked ground fault protection system using a single window type rectangular split core current transformer for each circuit and separate relays as specified in Section 26 28 20 – Zone Interlocked Ground Fault Relay Systems.

F. Other devices as shown on the Drawing or Schedules.

PART 3 EXECUTION

3.01 PANELBOARD INSTALLATION

- A. Install panelboards following manufacturer's instructions.
- B. Mount panelboards plumb and rigid.
- C. Mount flush panelboards so that the trim fits flat against finished wall.
- D. For MLO panelboards, install compression lugs on conductors with press and die recommended by lug manufacturer. Bolt lug to bus.

3.02 IDENTIFICATION

- A. Properly and accurately label panel directories by hand during construction.
- B. Install neatly typed, accurate directories in holders prior to Substantial Completion.
- C. Identify panelboard and its source with a nameplate.

3.03 KEYS

- A. Keep panelboard keys properly marked and identified with panel number and location.
- B. Furnish the Owner at least 2 copies of all panelboard keys, with tag showing identifying number and location of panel.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. Enclosed switches.
- B. May also be referred to as disconnect switches, safety switches, and/or service disconnects switches.

1.02 SUBMITTALS

- A. Not required.

PART 2 PRODUCTS

2.01 ENCLOSED SWITCHES

- A. Type of Enclosure: See paragraph 3.02.
- B. Service Disconnect Switches: 3 pole plus neutral and ground. Other switches: 3 pole plus ground unless neutral is required by the Drawings.
- C. 600 Volt unless shown otherwise on the Drawings.
- D. Ampere Rating: As shown on the Drawings.
- E. Heavy duty, padlockable to the off position.
- F. Switch Mechanism: Positive action quick-make, quick-break, with visible blades.
- G. Non-fusible: Where shown on Drawings.
- H. Fusible:
 - 1. Where shown on Drawings.
 - 2. Fuse clips reject all except Class R current limiting fuses.
- I. Provide electrical interlock kits, as shown in the Drawings, on those switches through which the control circuit wiring is routed. The kit shall have 1 NO and 1 NC contact rated 10 A resistive and 6 A inductive or 2 NO where noted. The contacts, when actuated, shall break the control circuit before the safety switch opens.
- J. Switches with non-metallic NEMA 4X enclosures: Square D Class 3110 Krydon® or Engineer reviewed equivalent.

- K. Switches with NEMA 1, 3R, 12, 4X SS enclosure: General Electric Type TH, Cutler-Hammer DH, Square D Class 3110, or Engineer reviewed equivalent.
- L. Switches with NEMA 7, 8, or 9 enclosure: Crouse Hinds FLS, or Engineer reviewed equivalent.

PART 3 EXECUTION

3.01 MARKING

- A. Furnish engraved nameplate on each switch.
- B. Text as shown on the Drawings, but if not shown, then:
 - 1. Source of power to the switch, example “Fed From MCC1.”
 - 2. Name and Tag Number of equipment served, example “Influent Lift Pump 1, PMP1011.”

3.02 TYPE OF ENCLOSURE

- A. Comply with the matrix which is appended to this Section.
- B. If not shown in matrix, comply with requirements shown on Drawings.
- C. If not shown in either place, then:
 - 1. NEMA 1 in indoor non-process areas, such as: blower rooms, electrical rooms, administration building offices and mechanical rooms.
 - 2. NEMA 4X non-metallic in indoor process areas where there is liquid piping but no open liquid, such as a room with sludge pumps.
 - 3. NEMA 4X SS in indoor process area where there is open liquid, such as a membrane basin.
 - 4. NEMA 3R outdoors in areas more than 100 feet from a primary/secondary process structure. This includes structures containing raw or partially treated sewage but not a UV disinfection structure.
 - 5. Stainless steel NEMA 4X in all other indoor and outdoor areas, including but not limited to areas less than 100 feet from a primary/secondary process structure.
 - 6. Regardless of any/all other requirements above: NEMA 7 in classified (hazardous) areas, whether indoors or outdoors.

END OF SECTION

SECTION 26 36 23

AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Automatic transfer switches (ATS).

1.02 SUBMITTALS

- A. Complete manufacturer's catalog cuts and rating sheets.
- B. Enclosure drawings
- C. Short circuit withstand and close rating, as tested in combination with the upstream protective device furnished for this project.
- D. Third-party ISO 9001 2000 certificate for factory.

1.03 OPERATION AND MAINTENANCE DATA

- A. Catalog cuts and rating sheets.
- B. Schematic diagrams
- C. Internal connection diagrams
- D. Manufacturer's O&M Manual
- E. Complete parts manual.
- F. Factory test report.

1.04 QUALITY ASSURANCE

- A. Furnish ATS from a factory which is ISO 9001 2000 certified.
- B. Furnish ATS which comply with the requirements of:
 1. IEC 947-6-1 Low-voltage Switchgear and Controlgear, Multifunction equipment, Automatic Transfer Switching Equipment
 2. NFPA 70 - National Electrical Code
 3. NFPA 99 - Essential Electrical Systems for Health Care Facilities
 4. NFPA 110 - Emergency and Standby Power Systems
 5. NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches
 6. CSA C22.2, No. 14 – M91 Industrial Control Equipment

7. IEEE 472: (ANSI C37.90A): Ringing wave immunity
8. EN55011, Class B Radiated Emissions
9. EN55011, Class B Conducted Emissions
10. IEC 1000-4-5 (EN 61000-4-5) AC Surge Immunity
11. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
12. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
13. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
14. IEC 1000-4-6 Conducted Field Immunity
15. IEC 1000-4-11 Voltage Dip Immunity
16. Transient Withstand: Provide ATS which pass the voltage surge withstand test requirements of IEEE 472 and the voltage impulse withstand test requirements of NEMA ICS-1-109.

- C. Furnish ATS which are listed under UL 1008, Standard for Transfer Switch Equipment, and which are factory labeled in accordance with that standard.

1.05 SOURCE

- A. Provide ATS from a factory authorized distributor of the switch, having full-time, local personnel who are trained in the repair of the ATS furnished and having a stock of spare parts for the type of ATS furnished.
- B. If an engine-generator is furnished for this project, then provide ATS:
1. Furnished, fully supported, and warranted by the engine-generator manufacturer and
 2. From the distributor who furnishes the engine-generator.
- C. If no engine-generator is furnished for this project then acceptable manufacturers are:
1. Caterpillar
 2. Cummins-Onan
 3. Zenith GE
 4. Engineer reviewed equivalent.

PART 2 PRODUCTS

2.01 RATINGS

- A. Voltage: As scheduled.
- B. Designed, tested, and third-party certified to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 3000 Meters. Minimum ampacity: as scheduled or as shown on the Drawings.
- C. Withstand and Closing Ratings:
1. Provide ATS with short-circuit withstand and close capability as scheduled, when used with the overcurrent protective devices of the ampacity shown on Drawings and of the type actually furnished for the project.

2. Label the ATS in accordance with UL 1008, including 1½ and 3 cycle, long-time ratings as required in UL 1008.
- D. Enclosure:
1. NEMA Type: As scheduled.
 2. Meet wire bending requirements of the NEC.
 3. Space available for transfer switches may be limited, as shown on Drawings. Switches with enclosures which do not fit in space shown will not be acceptable.

2.02 MAIN CONTACTS

- A. Specifically designed for transfer switch service.
- B. Designed so an overload or short circuit tends to force the contacts closed.
- C. Main and arcing contacts: visible without major disassembly and without disconnection of power conductors in order to facilitate inspection and maintenance.
- D. Where a 4 pole switch is required, furnish a neutral pole which:
 1. Has the same withstand and operational ratings as the other poles, or
 2. Breaks last and makes first to minimize neutral switching transients.
- E. Provide connection lugs which are suitable for the number and size of conductors shown on the drawings.

2.03 AUXILIARY CONTACTS

- A. Engine Start Contact:
 1. Gold-plated, 10-ampere at 24 VDC
 2. Single pole double throw.
 3. Provide time delay in control panel.
- B. ATS Position Switches:
 1. Operated directly by the main shaft of the main contacts.
 2. One closed in “Normal” and one closed in “Emergency”.
 3. Rated 480V, 10A.
- C. Provide other 10A contacts if so scheduled:
 1. Additional position switches.
 2. Fan Contact: Closed with engine running, SPST.
 3. Source Availability:
 - a. SPST, closed when normal power is available.
 - b. SPST, closed when emergency power is available.

2.04 OPERATING MECHANISM

- A. Mechanically lock contacts in position without the use of permanent magnets or latching solenoids.
- B. Mechanisms which utilize friction as the means of transmitting force from the operating mechanism to the contacts are not acceptable.
- C. Inherently double-throw, moving all contacts simultaneously, including the neutral contact (if furnished).
- D. Provide a manual operating handle for maintenance purposes.

2.05 CONTROL PANEL

- A. Operate correctly at ambient temperatures from -40 degrees C to +60 degrees C.
- B. Provide optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.
- C. Mount separately from the mechanism and connect to mechanism and potential source by plug-in cable(s).
- D. Solid-state with electronic timing.
- E. Provide field adjustable time delay functions:
 - 1. Time delay on momentary dips in normal source:
 - a. If so scheduled: 0 to 5 minutes, factory set at .5 minutes.
 - b. If so scheduled: 0 to 10 seconds, factory set at 2 seconds.
 - 2. Time delay on transfer to emergency for controlled loading of generator: 0 to 1 minute, factory set at 0 minutes.
 - 3. Time delay on retransfer to normal: 0 to 30 minutes, factory set at 20 minutes.
 - 4. Time delay on engine shutdown after retransfer to normal 0 to 5 minutes, factory set at 3 minutes.
 - 5. If so scheduled, provide a programmed delay in neutral position, field adjustable from 0 to 60 seconds.
- F. Provide close differential type voltage sensors, providing at least the following capabilities:
 - 1. Three phase RMS sensing accurate to 1% voltage and 0.2% frequency.
 - 2. Normal source sensing:
 - a. Under-voltage condition:
 - 1) Dropout field adjustable from 75% to 98% of nominal voltage, factory set to 94%
 - 2) Pickup field adjustable from 85% to 98% of nominal voltage, factory set to 97%.
 - b. Voltage unbalance: 1% to 12%, factory set to 4%.

- c. Loss of phase
 - d. Wrong phase rotation
- 3. Standby source sensing:
 - a. Under-voltage condition:
 - 1) Dropout field adjustable from 75% to 98% of nominal voltage, factory set to 75%
 - 2) Pickup field adjustable from 85% to 98% of nominal voltage, factory set to 93%.
 - b. Voltage unbalance: 1% to 12%, factory set to 4%.
 - c. Loss of phase
 - d. Wrong phase rotation
 - e. Frequency pickup field adjustable from 90 to 100% pickup, factory set to 95%.

- G. Provide Hand Controls:
 - 1. Pushbutton to bypass retransfer delay.
 - 2. Test switch to simulate failure of normal source. Three position switch or equivalent function with two switches:
 - a. With Load
 - b. Normal
 - c. Without load.

- H. Unless scheduled otherwise, provide seven-day exercise clock, including with/without load selector switch.

- I. Provide, as a Minimum, Front Panel LED Indicators:
 - 1. Normal and emergency position indicator lamps.
 - 2. Normal and emergency source available lamps.
 - 3. Provide lamp test button.

- J. If so scheduled, provide one pre-transfer contact that opens 5 seconds before the switch transfers from normal to emergency and one pre-transfer contact that opens 5 seconds before the switch transfers from emergency to normal.

- K. Provide Terminal Board Points for:
 - 1. Remote test/peak shave operation.
 - 2. Transfer inhibit to the emergency source.
 - 3. Forced transfer to neutral, if so scheduled.

- L. Provide at Least the Following Metering:
 - 1. Frequency Meter.
 - 2. Three phase ammeter with phase selector switch.
 - 3. Three phase voltmeter with phase selector switch.

- M. Provide terminal blocks for all field-wiring connections.

- N. Provide other features and capabilities as scheduled.

2.06 FACTORY TEST

- A. Have the complete ATS factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Provide certified copies of test results.

PART 3 EXECUTION

3.01 MARKING

- A. Furnish multiple nameplates for each ATS.
 - 1. Nameplate on face of enclosure with name of switch, name of normal source, name of standby source, and name of equipment served.
 - 2. Nameplates inside enclosure, adjacent to respective conductors, engraved with:
 - a. Name of normal source
 - b. Name of standby source
 - c. Name of equipment served

3.02 TESTING

- A. Test as part of the overall standby power system as required by the NEC for legally required standby systems.

3.03 SCHEDULE

- A. Main contacts rated minimum 600V AC. Controls and sensing system: suitable for operation on 480V AC 3 phase 3 wire or 4 wire systems except wher shown as 208V on the Drawings..
- B. Switched poles:
 - 1. Three For 480V.
 - 2. Four for 208V.
- C. Neutral Bar:
 - 1. 480V: Not required.
 - 2. 208V: Connection to switched pole.
- D. Minimum ampere rating:
 - 1. As Shown on Drawings
- E. Minimum short circuit withstand and close rating:
 - 1. 42kA for 480V switches
 - 2. 10kA for 208V switches
- F. Enclosure: NEMA 1

- G. Time delay before engine start on momentary dips in normal source: 0 to 10 seconds.
- H. Time delay in neutral.
- I. Utility Available Contact; Generator Available Contact.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTIVE DEVICES FOR LOW VOLTAGE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surge protective devices for low voltage electrical power systems.

1.02 SUBMITTALS

- A. Manufacturer's literature, including rating information.

1.03 O&M MANUAL

- A. List of suppressors used on this project with manufacturer's name, SPD type, part (catalog) number, and (for each part so provided) serial number. The use of a generic or typical part number will not be acceptable. Provide the part number which was used to order the part with all choices and options included. If a part number is given on a nameplate on the actual part, then include that number on this list. If the ordering number and the nameplate number differ, include both numbers and explain the difference.

PART 2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES (SPD): COMMON REQUIREMENTS

- A. Comply with the requirements of:
 - 1. UL 1449 – Third Edition.
 - 2. IEEE C62.41. Location/exposure Categories below refer to this standard.
 - 3. IEEE C62.45 for test methods.
 - 4. ISO 9001: 2000 certified.
- B. Testing:
 - 1. Performed by an independent testing laboratory.
 - 2. Test as a complete unit. Testing of the surge current capacity of a single MOV or SAD and extrapolation of overall rating from that is not acceptable.
- C. Voltage: As shown on the Drawings.
- D. Surge Capacity: As shown on Drawings or Schedule.
- E. Protection modes for units installed at service equipment and at the transformer or first panelboard of a separately derived system: line to neutral and line to ground.

- F. Protection modes for units installed downstream of the above units: Line to neutral, line to ground, and neutral to ground.
- G. Repetitive impulse: 5,000 hits
- H. Response Time: Less than 1 nanosecond.
- I. Voltage Protection Rating, (VPR – 3kA): Not more than shown in the following table using tests as defined in UL1449 – Third Edition.

| <u>Voltage</u> | <u>Type</u> | <u>L-N</u> | <u>L-G</u> | <u>N-G</u> | <u>L-L</u> | <u>In</u> | <u>SCCR</u> | <u>MCOV</u> |
|----------------|-------------|------------|------------|------------|------------|-----------|-------------|-------------|
| 208/120 | 1 | 700 | 700 | 700 | 1000 | 20kA | 200kA | 150 |
| 480/277 | 1 | 1200 | 1200 | 1200 | 1800 | 20kA | 200kA | 320 |
| 480V Delta | 1 | - | 1800 | - | 2000 | 20kA | 200kA | 550 |
| 240/120 | 2 | 330 | - | 330 | 700 | 10kA | 200kA | 150 |

- J. Environmental:
 1. Temperature: Minus 25 degrees C to plus 60 degrees C.
 2. Humidity: 0% to 95%, non-condensing.
- K. Internally protected against short-circuit and overload. Suitable for connection to the circuit which it is protecting by means of a molded-case switch.
- L. Warranty:
 1. Type 1: Ten-year full replacement warranty.
 2. Type 2: Five-year full replacement warranty.
- M. Enclosure as shown on the Drawings.
- N. Hard-wired.
- O. Where sine wave tracking is required in “Type” paragraphs below, provide hybrid design incorporating filters, capacitors, or other technology in addition to MOVs and SADs to remove low voltage high frequency disturbances at any phase angle that will limit the let-through voltage of an A1 Ring Wave voltage relative to the applied 60 Hz. voltage to not more than shown in the following table.
- P. Other Features:
 1. LED indication of operational state of suppressor for each phase/mode.
 2. Modular plug-in suppressor units for easy replacement.
 3. Symmetrically balanced metal oxide varistors (MOV).
 4. As required in “Type” paragraphs below.
 5. As shown on the Drawings or Schedule.

2.02 TYPE

- A. Surge Capacity of 250kA and greater
 1. High surge current device designed for service equipment and rated for location/exposure Category C3.
 2. Features: Dry form C contact for external alarm indication.
- B. Surge Capacity greater than 100kA and less than 250kA
 1. High surge current device designed for service equipment and rated for location/exposure Category C3.
 2. Features: Dry form C contact for external alarm indication.
 3. Sine wave tracking.
- C. Surge Capacity of 100kA or less
 1. Sine wave tracking.
 2. Dry form C contact for external alarm indication, only if shown on the Drawings or Tag List.

PART 3 EXECUTION

3.01 INSTALLATION OF HARD-WIRED SPD

- A. Plan the installation in advance so that an SPD is installed immediately adjacent to (above, left, right, or below) the protected equipment.
- B. Connect to circuit being protected by means of a molded case switch (non-automatic circuit breaker) or circuit breaker as shown on the Drawings.
- C. Connect SPD with minimum #8 stranded wire or as shown on the Drawings, whichever is greater. If manufacturer recommendation is different, the Engineer will resolve conflicts.
- D. Make connecting conductors as short as practical: Maximum 24 inches. Sharp bends in conductors are not acceptable. If the configuration of the SPD is such that shorter lead length can be achieved by mounting the enclosure rotated 90 or 180 degrees from "normal" then do so if allowed by the manufacturer of the SPD. Do not mount with hinge on bottom.

3.02 SCHEDULE

- A. Type and surge capacity as shown below unless shown otherwise on Drawings.
 1. 480V Switchboards: type 1, 250kA surge capacity.
 2. 480V MCCs: type 1, 150kA surge capacity.
 3. 480V Panelboards: type 1, 150kA surge capacity.
 4. 208/120V Panelboards: Type 2, 80kA surge capacity.
 5. 240/120V Panelboards: Type 2, 80kA surge capacity.

END OF SECTION

SECTION 26 50 10

LED LUMINAIRES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Luminaires, lamps, mounting hardware, and accessories for interior and exterior lighting applications as specified and/or as shown in the Luminaire Schedule and/or Drawings.

1.02 SUBMITTALS

- A. For luminaires which are listed by manufacturer and type and/or catalog number in the Luminaire Schedule or Drawings, provide:
 - 1. Bill of Material:
 - a. Type Number
 - b. Manufacturer's name and model name
 - c. Complete catalog number
 - d. Driver voltage and current
 - e. Catalog number
 - 2. Cut sheets for each luminaire.
- B. For manufacturers, type, and catalog numbers not listed in the Luminaire Schedule or Drawings:
 - 1. Comply with Section 01 25 00 – Substitution Procedures.
 - 2. Unless waived in writing by the Engineer, provide pre-wired sample for Engineer review, which will be returned, or prepare a presentation to engineer on proposed luminaires.
 - a. Pre-wired with 15A, 120VAC plug.
 - 3. NRTL certification and verification.
 - 4. Lighting layout showing performance of proposed luminaires which shall meet minimum maintained fc levels as shown on the in the Schedule or on Drawings.
 - 5. IES photometric files.
 - 6. Supporting data for L_{xx} value with respect to site conditions.
 - 7. All data as required in paragraph A above.

1.03 OPERATION AND MAINTENANCE DATA

- A. Bill of Material, meeting the requirements of 1.02 A., for all luminaires. If some items were allowed as substitutions, add them to the Bill of Material. It is not necessary to provide cut sheets or literature except as required below for replacement parts.
- B. Manufacturers maintenance data, including replacement parts list. Provide illustrations of parts and their location in the luminaire assembly.

1.04 CATALOG NUMBERS

- A. Recognize that a particular catalog number shown below or in the Schedule may not exactly represent the features required in the description below or in the Schedule, such as:
 - 1. Type of driver for a multi level or diming luminaire.
 - 2. Battery backup provisions.
 - 3. Integral photocell.
 - 4. Integral motion detection.
- B. Provide luminaires having all required features and show complete, detailed catalog numbers and options in the submittal.

PART 2 PRODUCTS

2.01 LED LUMINAIRES

- A. Voltage: 120VAC unless shown otherwise in the Schedule or on the Drawings.
- B. Modular Design. Capable of replacing driver, LED light bars, and accessories independently for failure replacement or upgrades.
- C. CRI: 70 minimum
- D. Driver Current: 350mA unless shown otherwise in the Schedule or on the Drawings.
- E. Temperature: 3500K unless shown otherwise in the Schedule or on the Drawings.
- F. Foot Candle (FC) Levels: As recommended by IESNA or as shown in the Schedule or on the Drawings, whichever is greater.
- G. Mounting: As shown on the Drawings.
- H. Proper UL listings for dry/damp, wet, and hazardous (wet locations and vapor tight NEMA 4X) locations.
- I. Driver:
 - 1. Power Factor: > .90
 - 2. Total Harmonic Distortion (THD): <20%
 - 3. Integral surge suppression protection in accordance with IEEE C62.41.2 and ANSI 62.41.2.

2.02 BATTERY BACKUP LUMINAIRES

- A. Where shown in the Luminaire Schedule and/or Drawings, furnish self-diagnostic battery system for standby operation.
- B. Provide a minimum 1300 lumens per luminaire of illumination for 90 minutes during a power outage.
- C. Furnished, installed in the driver channel, and wired by luminaire manufacturer. Indicator lights easily visible from below.

2.03 OCCUPANCY SENSOR

- A. Wall-mounted with manual override.
- B. Single-point or 3-way as required on Drawings.
- C. Infrared and ultrasonic motion sensors, plus photocell.
- D. Cooper OSW-DT or Engineer reviewed equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's recommendations and the Drawings. If not available from the manufacturer of the specific equipment and not shown on the Drawings, install according to the best trade practice.
- B. Furnish fittings, hangers, stems, parts, etc., as required for proper installation.
- C. Securely support luminaires so that they are level and in vertical and horizontal alignment unless specifically shown otherwise on the Drawings.
- D. Clean luminaires, install lamps, and test systems prior to acceptance by the Engineer.

3.02 SCHEDULE

- A. Provide luminaires which comply with the requirements of this Section and with the requirements of the Luminaire Schedule on the Drawings.

END OF SECTION

SECTION 31 10 00

REMOVALS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This work includes the removal and disposal of all obstructions, materials, and resultant debris required for the completion of construction.

1.02 REFERENCES

- A. Manual on Uniform Traffic Control Devices (MUTCD).

1.03 QUALITY ASSURANCE

- A. Conduct removal operations to prevent damage to adjacent property, buildings, and other facilities.
- B. Any damage to adjacent property or facilities shall be promptly repaired at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 EXPLOSIVES

- A. The use of explosives for removals is prohibited.

PART 3 EXECUTION

3.01 REMOVAL

- A. Remove all items shown on Drawings to be removed.
- B. Contractor shall not remove any other items without approval from Engineer.
- C. Excavation created during removal operations shall be barricaded in accordance with MUTCD.
- D. Contractor shall perform miscellaneous excavating, backfilling, and reshaping of slopes as required.

3.02 DISPOSAL

- A. Contractor shall haul and dispose of all debris, rubbish, broken concrete, broken asphaltic concrete, rocks, and other material removed.

- B. Disposal: In accordance with applicable State and Federal Regulations.
- C. Burning of debris and rubbish will not be permitted on the project site.

END OF SECTION

SECTION 31 23 01

EXCAVATION AND FILL FOR SITE WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Site Excavation, Filling and Backfilling.
- B. Precast Utility Structure Excavation, Filling, and Backfilling.
- C. Compaction of Fill and Backfill.
- D. Finish Grading.

1.02 RELATED WORK

- A. Section 31 23 33 – Trenching and Backfilling

1.03 REFERENCES

- A. ASTM C33 – Standard Specification for Concrete Aggregates.
- B. ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- D. ASTM D4318 – Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:
 - 1. Laboratory Test Results for Select Fill, Ordinary Fill, and Pea Gravel:
 - a. Moisture-density relationships (ASTM D1557).
 - b. Gradation (ASTM C136).
 - c. Liquid limit, plastic limit, plasticity index (ASTM D4318).

1.05 PROTECTION

- A. Protect trees, shrubs, lawns, and other features remaining as a portion of final site.
- B. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from equipment and vehicular traffic.
- C. Protect above and below grade utilities which are to remain.

- D. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- E. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- F. Grade excavation top perimeter to prevent surface water run-off into excavation.
- G. Protect structure walls, foundation, and similar features from structural stress during backfilling operations.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Material removed from excavations may be used for fill or backfill provided such material meets the requirements for fill and backfill specified in this Section. Some blending of materials may be necessary.
- B. Exclude debris, large rocks, roots, organic material, expansive material and other deleterious materials.
- C. Provide additional fill materials if necessary from off-site locations obtained by Contractor.
- D. Do not use any materials containing any contaminants that may endanger public health. Do not use mine tailings.
- E. Do not use any materials which have not been reviewed by the Engineer.

2.02 MATERIALS

- A. Select Fill:
 - 1. Clean, well graded, relatively cohesionless material free of organic or frozen matter.
 - 2. Largest rock or clod dimension, 1”.
 - 3. Plasticity index less than 8.
 - 4. Maximum percent passing sieve (unless otherwise reviewed by Engineer):
 - a. #10, 50%.
 - b. #40, 30%.
 - c. #200, 15%.
- B. Ordinary Fill:
 - 1. Clean, free of organic or frozen matter.
 - 2. Largest rock or clod dimension, 3”.
 - 3. Normally acceptable are Unified Soil Classification System Classified Materials: GW, GP, SW, SP, GM, SM, or GC.

- C. Normal Backfill:
 - 1. Excavated earth or sand thoroughly mixed to create uniform material.
 - 2. Free of trash, debris, organic or frozen matter.
 - 3. Largest rock or clod dimension, 2”.
- D. Pea Gravel:
 - 1. Mineral aggregate graded 0.25” to 0.38”.
 - 2. Free of soil, clay and shale; free of organic, frozen debris, or foreign matter.
- E. Sandfill:
 - 1. Clean, well-graded material conforming to requirements of ASTM C33 for fine aggregate.
- F. Moisture Barrier: 10 mil minimum polyethylene sheet.

PART 3 EXECUTION

3.01 GENERAL

- A. The type of bearing material and the thickness and extent of structural fill (if required) are shown on the Drawings.
- B. Interior non-structural slabs-on-grade are to be supported on granular fill not less than 6 inches thick on structural fill not less than one foot thick. See Drawings for location where sand fill over polyethylene moisture barrier is required over granular fill.
- C. Do not place or compact fill or backfill when the atmospheric temperatures are below 35 degrees Fahrenheit. Protect completed fill or backfill areas from freezing. Recondition, reshape and recompact to the requirements of this section without additional cost to the Owner any areas which are damaged by freezing.

3.02 SHEETING, SHORING AND BRACING

- A. Provide sheeting, shoring and bracing where required to hold walls of excavation and to protect workers and existing construction. Contractor shall be responsible for proper sizing and placement of Work.
- B. Remove sheeting, shoring and bracing in manner to avoid damage to disturbance to Work. Leave sheeting and shoring in place where removal will endanger Work, adjacent construction or personnel. If sheeting or shoring is to be left in place, remove all traces of sheeting or shoring to a minimum depth of 2’-0” below finish grade unless otherwise reviewed by the Engineer.

3.03 CLEARING AND GRUBBING

- A. General: Clearing and grubbing are required for all areas shown on the plans to be excavated or where fill is to be constructed.
- B. Clearing:
 - 1. Remove and dispose of trees and other vegetation, downed timber, snags, brush, and rubbish within areas to be cleared.
- C. Grubbing:
 - 1. Remove stumps, matted roots, and roots larger than 2 inches in diameter from within 6 inches of the surface of areas on which fills are to be constructed, and within 18 inches of finished subgrade of roadways.
 - 2. Areas disturbed by grubbing shall be filled as specified in this section for embankment.

3.04 PREPARATION

- A. Excavation:
 - 1. Identify required lines, levels, contours, and datum.
 - 2. Identify all underground utilities and other facilities. Stake and flag locations.
 - 3. Identify and flag surface and aerial utilities.
 - 4. Maintain and protect existing utilities remaining which pass through work area.
- B. Backfilling:
 - 1. When necessary, compact subgrade surfaces to density requirements for backfill material.
 - 2. Cut out soft areas of subgrade not readily capable of in situ compaction. Backfill with select fill and compact to density equal to requirements for subsequent backfill material.

3.05 EXCAVATION

- A. Earth excavation shall consist of the excavation and removal of suitable soils for use as embankment as well as the satisfactory disposal of all vegetation, debris, and deleterious materials encountered within the area to be graded and/or in a barrow area.
- B. Excavate soil to the extent required for structure foundations, construction operations, and other work. See Drawings for extent of excavation required beneath and adjacent to structures.
- C. Barricade open excavations, keep spoil piles out of the way of the Owner's personnel and otherwise maintain safe access by the Owner's employees to the Owner's facilities during construction.
- D. Do not undercut existing construction.

- E. Do not permit surface water to enter open excavations. Provide barriers and positive drainage away from excavations as necessary. Remove promptly any water which may enter excavations from any source.
- F. Machine slope banks.
- G. After excavations are complete, notify Engineer for inspection of completed excavation. Do not begin placement of fill or begin other construction operations until excavation is reviewed by Engineer.
- H. Fill unauthorized over excavated areas beneath structures with select fill and compact to density required for subsequent fill or backfill. If unauthorized excavation will result in structure being supported partly on select fill and partly on native material, extend excavation under entire structure and fill as specified below. Fill unauthorized overexcavated areas away from structures with fill of the type specified for subsequent fill compacted to the density specified.
- I. Dispose of all excess excavated material and material unsuitable for backfilling generated by construction activities, off-site or as directed by Owner, unless otherwise stated in Contract Documents at no additional cost to Owner. Properly dispose of all materials in accordance with regulatory requirements.

3.06 SUBGRADE TREATMENT

- A. At areas to receive structural fill, scarify the exposed native soils to a depth of not less than 12 inches. Add or remove water as necessary to bring the scarified material to optimum moisture content (within -0, +2 percentage points). Compact the scarified soil to not less than 95 percent of maximum dry density as determined by ASTM D1557.

3.07 FILLING AND BACKFILLING

- A. Provide all fill material required to complete Work, either from on-site excavations or imported from off-site, at no additional cost to Owner.
- B. Backfill areas to contours and elevations shown on Drawings using unfrozen materials.
- C. Place fill under structures and elsewhere as shown on the Drawings. Fill all unauthorized or excess excavations to the elevations shown or specified.
- D. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces.
- E. Backfilling Around Structures:
 - 1. Backfill after concrete has attained sufficient strength to withstand backfill pressures without detrimental effects.

2. Prevent displacement of construction during backfilling operations; backfill opposite sides simultaneously.
- F. Placement:
1. Maintain surfaces free of water, debris, and other deleterious materials.
 2. Place backfill and fill materials in successive horizontal layers not more than 8" in loose depth.
 3. Place material at optimum moisture content (plus or minus two percentage points).
 4. Material too dry or too wet shall be moistened or aerated to extent necessary to bring moisture content to within specified limits.
- G. Compaction:
1. Compact fill and backfill using appropriate equipment as needed to achieve the densities specified below. Densities are expressed as percentages of the maximum dry density as determined by ASTM D1557.
 2. Do not use heavy equipment in areas where existing construction may be damaged by the use of such equipment. Repair or replace without additional cost to the Owner, any damage to existing construction caused by earthwork operations.
- H. Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise. Fill depressions and provide for positive drainage away from buildings and structures.
- I. Make changes in grade gradual. Blend slopes into level areas. Finish grade to smooth uniformly sloping surfaces to elevations required for drainage.
- J. Finish surface by grading to provide finished appearance.
- K. Place polyethylene moisture barrier at locations shown on the Drawings. Overlap not less than 6 inches at all joints; tape joints securely. Protect from damage during placement of sand fill. Repair any rips or tears. Place not less than 3 inches of sand fill over polyethylene moisture barrier beneath slabs-on-grade where shown on Drawings.
- 3.08 TOLERANCES
- A. Top Surface of Backfill: Plus or minus 2 inches.
 - B. Top Surface of Fill Beneath Structures: Minus 1 plus 0 inches.
- 3.09 FIELD QUALITY CONTROL
- A. Section 01 45 23 – Testing Laboratory Services.

- B. Test Schedule:
1. One field density test for each 250 square yards of prepared subgrade.
 2. One field density test for each 100 cubic yards of fill or for each layer of fill, whichever results in the greater number of tests.
 3. Or where directed by Engineer.
- C. If tests indicate that work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

3.10 SCHEDULE OF FILL AND BACKFILL

| <u>Area</u> | <u>Type of Material</u> | <u>Degree of Compaction</u> |
|---|-------------------------|-----------------------------|
| Beneath footings and slabs more than 10 inches thick and for a distance outside their perimeters equal to the depth of fill | Select fill | 95% |
| Beneath slabs less than 10 inches thick; pavements (except roadways) unless otherwise shown on Drawings | Select fill | 90% |
| General fills and embankments on the site | Ordinary fill | 90% |
| Non-structural areas except as otherwise shown on Drawings or directed by the Engineer | Ordinary fill | 85% |
| Backfill behind walls and below or adjacent to additional construction | Select fill | 95% |
| Backfill behind retaining walls | Ordinary fill | 90% |
| Backfill except as described above | Normal backfill | 90% |
| Where indicated on Drawings | Select fill | 95% |
| Fill within treatment structures, fill beneath interior slabs on grade over moisture barrier | Sand fill | 95% |

END OF SECTION

SECTION 31 23 23.33

FLOWABLE FILL BACKFILL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Trench Backfilling.
- B. Bedding of Buried Pipes.

1.02 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
 1. ASTM C31 – Making and Curing Concrete Test Specimens in the Field.
 2. ASTM C94 – Ready-Mixed Concrete.
 3. ASTM C138 – Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 4. ASTM C143 – Slump of Hydraulic-Cement Concrete.
 5. ASTM C150 – Portland Cement.
 6. ASTM C172 – Sampling Freshly Mixed Concrete.
 7. ASTM C192 – Making and Curing Concrete Test Specimens in the Laboratory.
 8. ASTM C231 – Air Content of Freshly Mixed Concrete by the Pressure Method.
 9. ASTM C260 - Air-Entraining Admixtures for Concrete.
 10. ASTM C558 – Moisture-Density Relations of Soil-Cement Mixtures.
 11. ASTM C618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 12. ASTM C685 – Concrete Made by Volumetric Batching and Continuous Mixing.
 13. ASTM D1633 – Compressive Strength of Molded Soil-Cement Cylinders.

1.03 SUBMITTALS

- A. Product data for cement and admixtures.
- B. Flowable fill mix design.
- C. Testing laboratory results on mix design to demonstrate compliance with specifications.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bedding Materials: Refer to Section 31 23 33 – Trenching and Backfilling.

- B. Backfill Material - Flowable Fill:
 1. Backfill materials are those materials placed in the trench between the bedding material and the top of the trench.

C. Materials Not Allowed: Refer to Section 31 23 33 – Trenching and Backfilling.

2.02 CONCRETE MIX - BACKFILL MATERIAL (Lean Backfill, Digable Material For Filling Excavations)

- A. Comply with ASTM C94, and ASTM C150, Portland Type I-II, low alkali.
- B. Portland Cement Content: Quantity sufficient to meet specified compressive strength range.
- C. Compressive Strength:
 1. Compressive strength requirement shall be fully achieved in time indicated.
 2. Compressive Strength at 28 Days: 35 psi minimum, 60 psi maximum when sampled and tested as specified in Part 3.
 3. Concrete shall not exceed maximum compressive strength because it shall be capable of being excavated with a backhoe tractor without any problems.
 4. Concrete that does not meet the specified strength in the specified time is not acceptable regardless of what strength it may later demonstrate, and at the Engineer’s sole discretion:
 - a. Shall be removed and replaced at the Contractor’s sole expense, or
 - b. May be allowed to remain as part of the project, but the Contractor will not be paid for the total in-place cost of the concrete.
- D. Admixtures:
 1. Batching method and time of introduction shall be in accordance with the manufacturer’s recommendations for compliance with this specification.
 2. Use of a water reducing admixture is optional.
 3. Calcium chloride shall not be used.
 4. Air Entraining Admixture: ASTM C260, 2% to 5% air.
- E. Combined Aggregate Gradation:

| <u>SCREEN SIZE</u> | <u>% PASSING</u> |
|--------------------|------------------|
| 1 inch | 100 |
| 3/4 inch | 95-100 |
| 3/8 inch | 82-100 |
| no. 4 | 70-100 |
| no. 8 | 55-85 |
| no. 16 | 38-60 |
| no. 50 | 6-30 |
| no. 100 | 2-10 |

- F. Slump: 5 inches to 8 inches.

G. Fly Ash: Class “C” or “F” fly ash as specified in ASTM C618 may be proportioned in the cementitious material as required to improve pumpability.

2.03 CONCRETE MIX – BACKFILL MATERIAL (Cement Slurry Mix For Filling Voids)

A. Comply with ASTM C94, and ASTM C150, Portland Type I-II, low alkali.

B. Cementitious Material Content: 141 to 235 pounds/cubic yard.

C. Compressive Strength:

1. Compressive strength requirement shall be fully achieved in time indicated.
2. Compressive Strength at 28 Days: 50 psi minimum, 150 psi maximum when sampled and tested as specified in Part 3.
3. Concrete that does not meet the specified strength in the specified time is not acceptable regardless of what strength it may later demonstrate, and at the Engineer’s sole discretion:
 - a. Shall be removed and replaced at the Contractor’s sole expense, or
 - b. May be allowed to remain as part of the project, but the Contractor will not be paid for the total in-place cost of the concrete.

D. Admixtures:

1. Batching method and time of introduction shall be in accordance with the manufacturer’s recommendations for compliance with this specification.
2. Use of a water reducing admixture is optional.
3. Calcium chloride shall not be used.
4. Air Entraining Admixture: ASTM C260, 8% to 30% air.

E. Combined Aggregate Gradation:

| <u>SCREEN SIZE</u> | <u>% PASSING</u> |
|--------------------|------------------|
| 3/8 inch | 100 |
| no. 4 | 90-99 |
| no. 8 | 60-95 |
| no. 16 | 45-80 |
| no. 50 | 10-40 |
| no. 100 | 5-45 |

F. Fly Ash: Class “C” or “F” fly ash as specified in ASTM C618 may be proportioned in the cementitious material up to 150 pounds/cubic yard. to improve pumpability.

PART 3 EXECUTION

3.01 INSPECTION

- A. Refer to Section 31 23 33 – Trenching and Backfilling

3.02 BATCHING, MIXING AND DELIVERY

- A. Ready-Mixed Concrete: ASTM C94.
- B. Field Batched Concrete: ASTM C685.
- C. Delivery Ticket: Deliver to Owner's Field Representative prior to unloading at site.
 1. Name of flowable fill supplier.
 2. Delivery ticket number.
 3. Date of delivery.
 4. Name of Contractor.
 5. Name or location of project.
 6. Design mix number.
 7. Volume of flowable fill in load.
 8. Time loaded.
 9. Batched weight of cement, fly ash, fine aggregate, coarse aggregate.
 10. Batched weight or volume of admixtures and water.
 11. Reading of mixer drum revolution counter at start of mixing.
 12. Certification that materials delivered are same brand, type and source as those defined in the design mix authorized by the Engineer.
 13. Target proportions of the design mix.
 14. Weight or volume of water added at the job site.
 15. Signature and name of person who authorized addition of water after leaving the batch plant, and affiliation to the project.

3.03 PLACING

- A. Secure utility pipe from movement and flotation.
- B. Place flowable fill uniformly without voids or segregation.
- C. Place flowable fill in lifts not exceeding 4 feet in height. Do not place over previous lift until previous lift has been placed for at least 2 hours.
- D. Do not place flowable fill on frozen material, in standing water, or during rain. Protect flowable fill from flooding or disturbance for at least 24 hours after placement.
- E. Place flowable fill only when ambient temperature is at least 35°F and rising. When ambient temperature at the time of placement is less than 40°F, the temperature of the flowable fill placed shall not be less than 50°F.

3.04 APPLICATION OF LOAD

- A. Do not place any load on flowable fill until it exceeds a penetration resistance of 12 psi.
 - 1. Penetration resistance will be considered acceptable if a person weighing at least 150 pounds, by using his body weight as an axial load on a 3-1/2-inch x 3-1/2 inch wooden block, cannot penetrate the material more than 1 inch.

3.05 FIELD QUALITY CONTROL

- A. Field quality control is required to insure compliance with the project requirements. All portions of the field quality control sampling and testing shall be performed by the testing laboratory selected by the Contractor and accepted by the Engineer.
- B. Field quality control testing shall include but not be limited to the following:
 - 1. Sampling: ASTM C172.
 - 2. Test Sample:
 - a. Frequency: One for each 150 CY or each day's placement, whichever is greater.
 - b. Field Tests:
 - 1) Slump: ASTM C143.
 - 2) Air Content: ASTM C231.
 - 3) Unit Weight: ASTM C138.
 - 4) Temperature
 - c. Compression Tests:
 - 1) Sample: Do not use material from the field tests.
 - 2) Molds: 4-inch diameter x 4.5-inch high, free-draining at base, ASTM D 558.
 - 3) Initial Field Curing: 24 +/- 4 hours in mold, ASTM C31.
 - 4) Laboratory Curing: After initial curing, extrude from mold and cure in laboratory per ASTM C192, do not cure in curing tank.
 - 5) Number of Specimens: Four; test one at 1 day, one at 7 days, and two at 28 days.
 - 6) Compression Testing: ASTM D1633.
 - 3. Reporting:
 - a. Written report to Engineer within 4 days of completion of a test.
 - b. Non-complying Test Results: Notify Engineer within 1 working day after completion of a test.

3.06 SCHEDULE

- A. Backfill with lean backfill and cement slurry mix where indicated on Drawings.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Trenching, Backfilling, and Compacting for Buried Pipes and Manholes
- B. Bedding of Buried Pipes
- C. Pipe Marking Systems

1.02 REFERENCES

- A. ASTM C12 – Installing Vitrified Clay Pipe Lines
- B. ASTM D256A – Determining the Izod Pendulum Impact Resistance of Plastics, Method A
- C. ASTM D638 – Tensile Properties of Plastic
- D. ASTM D695 – Compressive Properties of Rigid Plastics
- E. ASTM D790 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- F. ASTM D1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- G. ASTM D1593 – Non-Rigid Vinyl Chloride Plastic Film and Sheeting
- H. ASTM D2321 – Underground Installation of Flexible Thermoplastic Sewer Pipe
- I. ASTM D2583 – Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
- J. ASTM D2774 – Underground Installation of Thermoplastic Pressure Piping
- K. ANSI/AWWA C150/A21.50 – Thickness Design of Ductile-Iron Pipe
- L. ANSI/AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
- M. ANSI/AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances
- N. ANSI/AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fitting for Water

O. OSHA Regulations, 29 CFR 1926 Subpart P – Excavations

1.03 SUBMITTALS

A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:

1. Testing laboratory results on bedding materials to demonstrate compliance with specifications.
2. Product data for identification tape, marker posts, tracer wire system, and electronic marker device system, if scheduled.

1.04 JOB CONDITIONS

- A. All trenching is unclassified.
- B. Protect adjacent structures and surrounding areas.
- C. Work to remain within available easements.
- D. Weather:
1. No backfill placement during freezing weather.
 2. No frozen materials, ice, or snow in backfill or fill.
 3. No backfill or fill on frozen surfaces.

1.05 REGULATORY REQUIREMENTS

- A. Comply with OSHA Standard 29 CFR Part 1926, Subpart P – Excavations, during all excavation, trenching, and shoring operations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bedding Materials:

1. Bedding materials are those materials located a maximum of 8" below bottom of pipe to bottom or spring line of pipe, depending on bedding class or condition required.
2. Material shall be granular and free flowing:
 - a. Maximum particle or clump size:
 - 1) Plastic Pipe 8" Diameter and Smaller: 0.25".
 - 2) All other Pipe: 0.75".
 - b. Portion Passing No. 200 Sieve: 50% maximum.
 - c. Free from refuse, organic material and frozen soils.
3. Materials require prior written approval.
4. Concrete: Division 03.

B. Initial Backfill Materials:

1. Initial backfill material is that material placed above the bedding material, around and over the pipe to 12" over the top of the pipe.
2. Material to be defined and required by applicable ASTM standard for installation for bedding class or type required or scheduled.

3. In no case shall initial backfill material contain particles or clumps with any dimension greater than:
 - a. Plastic Pipe 8" Diameter and Smaller: 0.25".
 - b. All Other Pipe: 0.75".
 4. If not otherwise defined, same as bedding material.
- C. Backfill Materials:
1. Backfill materials are those materials placed in the trench between the initial backfill material and the top of the trench.
 2. Material to be as defined and required by applicable ASTM standard for installation for bedding class or type required or scheduled.
 3. Backfill shall have no particles or clumps having a dimension larger than 6" within 3' of the top of the pipe.
- D. Materials Not Allowed:
1. All pipe bedding, initial backfill, and backfill material shall be clean and free of roots, vegetable or organic material, frozen material, mine tailings, or any contaminants that could endanger public health.
- E. Identification Tape:
1. Identification tape shall consist of high visibility, color coded inert polyethylene tape that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil.
 2. The tape shall have the following properties:
 - a. Minimum overall thickness: ASTM D1593: Plain, 4.0 mils; detectable, 4.5 mils.
 - b. Minimum tensile strength (longitudinal): ASTM D638: Plain, 1500 psi; detectable, 4,544 psi.
 - c. Maximum imprint length: 36".
 - d. Width: 3" for plain tape without metallic foil stripes.
 3. Tape to meet the APWA Uniform Color Code for utilities.
 4. Imprinted message, "Caution Buried Utility Line Below", printed with black letters on APWA approved colors.
 5. Acceptable Manufacturers:
 - a. Seton Identification Products, Branford, CT or Engineer reviewed equivalent.
- F. Tracer Wire System:
1. Provide tracer wire system as shown on the Drawings and as specified herein.
 2. Install single run of tracer wire on top of pipe.
 3. Secure wire to pipe every 10' with pipe wrap tape (tape required to hold wire in place during backfill).
 4. Bring wire to surface at every valve box, vault, hydrant, manhole, every 1,000 linear feet, and where shown on Drawings.
 5. Terminate wire at surface using a tracer terminal box.
 6. All tracer system components such as terminal box cover, wire insulation, and connectors shall be in accordance with APWA Uniform Color Code for utilities.
 7. Tracer Wire: #12 AWG, UL listed, 30V single conductor, tracer wire, with 30 mil high density polyethylene (HDPE) insulation.

- a. Copper-clad annealed high carbon 1055 grade steel wire, break load 452 lbs. steel core shall be manufactured in the United States. Copperhead Industries LLC, High Strength HS-CCS, or Engineer reviewed equivalent.
 - b. Solid strand copper, Agave Wire LTD, Paige Tracer, or Engineer reviewed equivalent.
 - c. If tracer wire is scheduled to be used on utilities installed by horizontal directional drilling, refer to Section 33 05 23.13 – Utility Horizontal Directional Drilling.
8. Pipe Wrap Tape:
- a. Material: 10 mil all weather polyvinyl film.
 - b. Durability: Resistant to moisture and corrosive soil.
 - c. Adhesion: Adheres to metal and plastic, and conforms to irregularities in substrate surface.
 - d. Elongation: 245%.
 - e. Tensile Strength: 30 psi.
 - f. Width: 2".
 - g. Printed Identification Marking: UPC code, and mil thickness.
 - h. Acceptable Manufacturer: Northtown Company, or Engineer reviewed equivalent.
9. Tracer Terminal Box:
- a. Copperhead Industries, LLC, Snake Pit Magnetized Tracer Boxes, or Engineer reviewed equivalent.
 - 1) Light Duty Box: Locate next to structures and not subject to direct damage (such as adjacent to a fire hydrant).
 - 2) Roadway Box: Locate in or adjacent to road and subject to road traffic.
 - 3) Concrete/Driveway Box: Locate in areas of concrete pavement.
10. Corrosion-Resistant Wire Connectors:
- a. Direct bury twist-on wire nuts, prefilled with dielectric silicone. For use when connecting between spools (2 conductors max.). Copperhead Industries, LLC, Agave Wire LTD, or Engineer reviewed equivalent.
 - b. Direct bury lugs, prefilled with dielectric silicone. For use when connecting to terminal electrical box. Copperhead Industries, LLC, Agave Wire LTD, or Engineer reviewed equivalent.
 - c. Acceptable for use in place of wire nuts and/or lugs, Copperhead Industries, LLC, twist locking, watertight connectors, with dielectric silicone, or Engineer reviewed equivalent.
11. Test for electrical continuity after installation in accordance with manufacturer's recommendations using manufacturer's cable tracing equipment. Provide test reports to Engineer for review.

PART 3 EXECUTION

3.01 INSPECTION

- A. Field verify location of underground utilities and obstructions.

3.02 CLEARING AND GRUBBING

- A. General: Clear and grub all areas within the construction limits that will be disturbed by trenching or stockpiling.
- B. Clearing: Remove and dispose of trees and other vegetation, downed timber, snags, brush, and rubbish within areas to be cleared.
- C. Grubbing: Remove stumps, matted roots, and roots larger than 2" in diameter from areas to be excavated and from within 6" of surface of areas to receive stockpiled material. Do not allow grubbed material to mix with trench backfill.
- D. Disposal:
 - 1. Haul and dispose of all debris, rubbish, vegetation, broken concrete, broken asphaltic concrete, rocks, and other material to be removed.
 - 2. Properly dispose of material in accordance with applicable state and federal regulations.
 - 3. Burning of debris and rubbish will not be permitted on the project site.

3.03 DEWATERING

- A. Provide and maintain adequate dewatering equipment to remove and dispose of surface and groundwater entering excavations, trenches, and other parts of the Work.
- B. Keep excavation dry during subgrade preparation and continuously thereafter until the structure to be built or the pipe to be installed is completed to the extent that no damage from hydrostatic pressure, flotation or other cause will result.
- C. Dewater excavations which extend to or below groundwater by lowering and keeping the groundwater level beneath such excavation at least 12" below the bottom of the excavation.
- D. Divert surface water or otherwise prevent it from entering excavated areas or trenches to the extent practical without damaging adjacent property.
- E. Contractor is responsible for the condition of any pipe or conduit he uses for drainage; all drainage pipes, ditches, etc. shall be left clean and free of sediment.

3.04 BLASTING

- A. Blasting is not allowed.

3.05 SHEETING

- A. If used, cut off at top of pipe and leave in place unless removal is specifically reviewed by Engineer.

3.06 STABILIZATION

- A. Thoroughly compact and consolidate trench bottoms so they remain firm, dense, and intact during required construction activities.

- B. Remove all mud and muck during excavation.
- C. Reinforce trench bottom with crushed rock or gravel if it becomes mucky during construction activities.
- D. Allow no more than 1/2" depth of mud or muck to remain on trench bottoms when pipe bedding material is placed thereon.
- E. Where trench bottoms-out in rock, rock is to be removed to 8" below bottom of pipe and replaced with bedding material.

3.07 TRENCH EXCAVATION

- A. Slope, bench, or support all trenches in conformance with OSHA Excavation Regulations, and follow all specified safety requirements.
- B. Do not open more trench in advance of pipe laying than is necessary to expedite the Work; not more than 400', unless otherwise authorized by Engineer.
- C. Except where jacking and boring is indicated on the Drawings, specified or permitted by Engineer, excavate trenches by open cut from the surface.
- D. Alignment, Grade, and Minimum Cover:
 1. Establish alignment and grade or elevation from offset stakes.
 2. Excavate trenches so pipes can be laid straight at uniform grade without dips or bumps, between the terminal elevations indicated on the Drawings.
 3. Comply with pipe specification sections regarding vertical and horizontal alignment and max joint deflection.
 4. Water lines to have minimum bury as shown on the Drawings, and in general, grade shall follow surface contours unless otherwise shown on the Drawings.
- E. Limiting Trench Widths:
 1. Excavate to a width which will provide adequate working space and pipe clearances for proper pipe installation, jointing, embedment.
 2. If needed to reduce earth loads to prevent sloughing cut banks back on slopes which extend not lower than 1' above the top of the pipe.
 3. Trench widths and minimum clearances between installed pipe and trench wall:

| <u>Pipe Size</u> | <u>Minimum Trench Width</u> | <u>Minimum Clearance</u> | <u>Maximum Trench Width at Top of Pipe</u> |
|------------------|-----------------------------|--------------------------|--|
| 18" or less | O.D. plus 16" | 8" | O.D. plus 24" |
| Larger than 18" | O.D. plus 24" | 12" | O.D. plus 24" |

- F. Mechanical Excavation:
 1. Do not use where its operation would damage trees, buildings, culverts, or other existing property, structures, or utilities above or below ground; hand-excavate only in such areas.

2. Use mechanical equipment of a type, design, and construction and operated so that:
 - a. Rough trench bottom elevation can be controlled.
 - b. Uniform trench widths and vertical sidewalls are obtained from 1' above the top of the installed pipe to the bottom of the trench.
 - c. Trench alignment is such that pipe is accurately laid to specified alignment and is centered in the trench with adequate clearance between pipe and trench sidewalls.
 - d. Do not undercut trench sidewalls.
- G. Cuts in Existing Paved Surfaces:
1. Applies to streets, sidewalks, curbs, driveways, and other existing paved surfaces.
 2. No larger than necessary to provide adequate working space.
 3. Cut a clean groove not less than 1-1/2" deep along each side of trench or around perimeter of excavation area.
 4. Remove pavement and base pavement to provide shoulder not less than 6" wide between cut edge and top edge of trench.
 5. Do not undercut trenches, resulting in bottom trench width greater than top widths.
 6. Make pavement cuts to and between straight or accurately marked curved lines parallel to trench centerline or limits of excavation.
 7. Where the trench crosses existing paved surfaces, remove and replace the paved surface between saw cuts as specified for pavement.
- H. Excavation Below Pipe:
1. Except as otherwise required, excavate trenches below the underside of pipes as indicated on the Drawings to allow placement of granular pipe bedding material.
 2. Where excavating in earth for 6" and smaller pipe, Contractor has the following options for excavating trench bottoms:
 - a. Excavate below pipe subgrade and place granular embedment.
 - b. Grade trench bottom to provide uniform and continuous support between bell holes or end joints.
- I. Excavation for Bell Holes:
1. Excavate to provide adequate clearance for tools and methods of pipe installation.
 2. Do not allow any part of bells or couplings to contact the trench bottom, walls, or granular embedment when pipe is joined.
- J. Excavated Material: Place stockpiled excavated materials in a manner that will not obstruct work or endanger personnel or the public.
1. Excavated materials shall not obstruct sidewalks or driveways for extended periods of time.
 2. Excavated materials shall not obstruct hydrants, valve pit covers, valve boxes, or other utility controls.
 3. Excavated materials shall not obstruct gutters, unless other temporary provisions have been made for street drainage.

4. Excavated materials shall not obstruct natural drainage ways.

- K. Surplus Excavated Material: Excavated material in excess of that needed to backfill to the limits indicated in the Contract Documents shall be properly disposed off-site in compliance with regulatory requirements at no additional cost to the Owner.

3.08 PIPE BEDDING

- A. Class D per ASTM C12
- B. Class C per ASTM C12
- C. Class B per ASTM C12
- D. Crushed Stone Encasement per ASTM C12
- E. Class A-I: ASTM C12 Class A-1 using plain concrete.
- F. Class A-II: ASTM C12 Class A-1 using reinforced concrete; No. 4 A-36 steel reinforcing bars parallel to pipe with steel area not less than 0.4% of the area of concrete above top of pipe.
- G. Class A-III: ASTM C12 reinforced concrete encasement; 3000 psi concrete; No. 4 A-36 steel reinforcing bars; reinforcing parallel to pipe with steel area not less than 0.4% of the area of concrete above and below pipe; reinforcing bars wrapped around parallel bars at 36" maximum spacing.
- H. Bedding class or type as scheduled.
- I. Carefully place bedding in accordance with ASTM C12 to provide uniform and continuous support to pipe barrel, except at bell holes in all cases. No bridging will be allowed.

3.09 MANHOLE SUBGRADE

- A. Subgrade Material: Use same bedding class as specified for adjacent pipe bedding.
- B. Compaction: 90% ASTM D1557.

3.10 TRENCH BACKFILL

- A. Material as defined by applicable reference for installation for type of pipe used.
- B. Bedding, Initial Backfill, and Backfill: If native materials cannot meet the requirements of Part 2 specified herein or if the specified field compaction cannot be obtained, Contractor shall import suitable material at no additional cost to the Owner.
- C. Bedding: Carefully "shovel-slice" or tamp bedding so that the material fills and supports the haunch area under the pipe without voids.

- D. Initial Backfill: Place in layers that do not exceed 8" in height of backfill material in its uncompacted state.
- E. Backfill: Place in layers heights suitable to enable the Contractor to achieve the specified compaction throughout the full depth of backfill using Contractor's selected means and methods and without damaging the pipe.
- F. Paved Traveled Areas:
 - 1. 90% ASTM D1557 compaction.
 - 2. Top 12" below subgrade, 95% ASTM D1557 compaction.
- G. Unpaved Traveled Areas and Treatment Plant/Pump Station Sites:
 - 1. 90% ASTM D1557 compaction.
- H. Untraveled Areas: Compacted to at least undisturbed natural density but not less than 90% ASTM D1557.
- I. Water Settled Backfill: Use only where permitted by Engineer:
 - 1. Where permitted, apply to obtain effective settlement with a minimum of water.
 - 2. Do not permit trench to overflow.
 - 3. Do not settle by water puddling until after trench has been backfilled to ground surface.
 - 4. Introduce water above the pipe embedment through a long pipe nozzle so disturbance of granular embedment or compacted material is held to an absolute minimum.
 - 5. Add backfill material to compensate for settlement below surface grade and settled during puddling operations.
- J. Install identification tape in backfill 24" directly above top of all buried pipe, unless otherwise scheduled or shown on Drawings. Use tape with metallic foil stripes for all non-metallic pipes.
- K. Upper 18" of trench shall contain no particles larger than 6" in any dimension.
- L. Surface Finish:
 - 1. For placement of paving or gravel surfacing, subgrade where applicable.
 - 2. Match existing and surrounding contours.
 - 3. Graded finished appearance.

3.11 FIELD QUALITY CONTROL

- A. Section 01 45 23 – Testing Laboratory Services
- B. Section 01 71 23 – Field Engineering
- C. Test Schedule unless otherwise directed by the Engineer:
 - 1. Minimum of one field density test for each compacted layer of trench backfill for each 250 linear feet of trench in traveled areas.

- D. Minimum of one field density test for each compacted layer of trench backfill for each 500 linear feet of trench in untraveled areas.
- E. Minimum of two field density tests for each compacted layer of trench backfill at each road crossing.

3.12 PIPE BEDDING SCHEDULES

- A. Cast or Ductile Iron Pipe:
 - 1. Minimum Bedding Class:

| <u>Pipe Diameter</u> | <u>Trench Depth To Top of Pipe</u> | <u>Bedding Class</u> |
|--------------------------|--|--------------------------|
| 14" or less | 5' or less | D |
| | 5' – 12' | C |
| | More than 12' | B |
| Larger than 14" | 12' or less | C |
| | More than 12' | B |

- B. PVC, HDPE, and Other Plastic Type Pipes:
 - 1. As recommended by manufacturer.
 - 2. Minimum Bedding Class:
 - a. Trench depth to top of pipe less than 10'; Class C.
 - b. Trench depth to top of pipe 10' or more; Class B.
 - 3. Gravity sewer lines bedded to meet maximum deflection requirements given with pipe specifications.

3.13 PIPE MARKING SCHEDULE

- A. Identification Tape: 3".
- B. Tracer Wire System:
 - 1. Wire Location: on pipe.
 - 2. Cable Tracing Equipment: N/A.
 - 3. Payment for Tracer Wire in Place: Refer to Section 01 29 00 – Payment Procedures, Paragraph 1.03.A.3.f.
- C. Utility Marker Posts: N/A.
- D. Electronic Marker Device (EMD): N/A.

END OF SECTION

SECTION 32 09 00

REMOVAL AND REPLACEMENT OF EXISTING SURFACES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Removal and replacement of existing asphalt and concrete paving, sidewalks, curb and gutter, and driveways removed incidental to the Work of the contract.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 166 – Test for Bulk Specific Gravity (G_m) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens.
 - 2. AASHTO T 209 – Theoretical Maximum Specific Gravity and Density of Hot-Mix Asphalt Paving Mixtures.
- B. American Society for Testing and Materials International (ASTM):
 - 1. ASTM D1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 2. ASTM D2950 – Density of Bituminous Concrete in Place by Nuclear Methods.
- C. New Mexico State Department of Transportation (NMDOT):
 - 1. Standard Specifications for Highway and Bridge Construction.

1.03 TESTING AND INSPECTION

- A. Representative samples shall be taken from each concrete truck and tested for:
 - 1. Slump
 - 2. Air entrainment
 - 3. Compressive strength (7 day, 14 day, 28 day) (4 cylinders per truck).

1.04 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:
 - 1. Product Data.
 - 2. Gradations and other laboratory results.
- B. Design mix for asphalt and concrete
- C. Certify that materials comply with specification requirements.
- D. Testing Laboratory Test Results

PART 2 PRODUCTS

2.01 MATERIALS

- A. All replacement materials to be new and of same quality or better than existing.

PART 3 EXECUTION

3.01 REMOVAL

- A. Asphaltic and Concrete Paving Material:
 - 1. Sawcut lines, the full depth of the material, straight and parallel without abrupt jogs, vertical to the surface.
 - 2. Broken out and removed entirely; rubble to be wasted at an approved location.
- B. Sidewalks and Curb and Gutter:
 - 1. Sawcuts at existing joints only.
 - 2. Broken out and removed entirely; rubble to be wasted at an approved location.
- C. Gravel Surface and Subgrade Material:
 - 1. Removed entirely.
 - 2. May be stockpiled and reused for replacement or removed and wasted at an approved location.
 - 3. Material for reuse must be clean, free of debris, organic and deleterious substances, and used only with the review of the Engineer.
 - 4. Provide gravel as necessary to restore surface to a condition satisfactory to the Owner.

3.02 PREPARATION FOR REPLACEMENT

- A. Subgrade materials same thickness and type as removed.
- B. Subgrade compaction as shown on the Drawings, not less than 90% modified Proctor, ASTM D1557.
- C. Existing gravel materials to be reused to be clean as required.

3.03 REPLACEMENT SCHEDULE

- A. Replacement shall be constructed to conform to existing lines, grades, shape, thickness, and finish, unless otherwise scheduled or shown on Drawings.
- B. Asphalt pavement to be placed with laydown machine when practical.
- C. Mix design for asphalt pavement shall meet New Mexico Department of Transportation Department Plant Mix Bituminous Pavement (PMBP), Gradation B requirements. Unless indicated otherwise, standard section shall be 4 inches PMBP on 6 inches compacted base course and 12 inches of subgrade preparation.

- D. Quality Control for Asphalt Pavement Compaction:
1. Monitor the compaction process by determining the density of the PMBP with a portable nuclear density test device in conformity with ASTM D2950. Calibration of the portable nuclear device shall be established from cut pavement samples. The density readings of the cut pavement samples shall be determined in accordance with AASHTO T 166 (weight, volume method) and the density readings of the pavement shall be determined by the portable nuclear density test device in conformity with ASTM D2950 and shall be correlated by the test lab. Conduct three density tests for each 500 sy, or fraction thereof, of each lift each day.
 2. The range density for acceptance of PMBP shall be 95% ($\pm 3\%$) of the theoretical maximum density as determined from AASHTO T 209.
- E. Concrete pavement, curb and gutter and gutter and sidewalks shall conform to Division 03, except the minimum 28-day compressive strength shall be 3,000 psi. Unless indicated otherwise, standard section shall match existing thickness (minimum 4 inches on 6 inches compacted base course and 12 inches of subgrade preparation.) Sections for concrete sidewalks do not require base course.
- F. Base course mix design shall conform to the New Mexico Department of Transportation, Standard Specifications for Highway and Bridge Construction, current edition-Section 303, gradation I.

END OF SECTION

SECTION 33 12 01

WATER SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipes, Materials, Valves, and Appurtenances for buried potable water and non-potable water service or uses as scheduled.
- B. Installation.

1.02 RELATED WORK

- A. Section 31 23 33 – Trenching and Backfilling
- B. Section 33 13 13 – Disinfection of Domestic Water Systems

1.03 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
 1. ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 2. ASTM A307 – Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
 3. ASTM A536 – Ductile Iron Castings.
 4. ASTM D523 - Test Method for Specular Gloss.
 5. ASTM D1248 - Polyethylene Plastics Extrusion Materials for Wire and Cable.
 6. ASTM D1784 – Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 7. ASTM D1785 – Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 8. ASTM D2239 – Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
 9. ASTM D2241 - Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 10. ASTM D2464 - Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 11. ASTM D2466 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 12. ASTM D2467 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 13. ASTM D2564 - Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
 14. ASTM D2672 - Joints for IPS PVC Pipe Using Solvent Cement.
 15. ASTM D2737 – Polyethylene (PE) Plastic Tubing.
 16. ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 17. ASTM D3139 - Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

18. ASTM D3350 – Polyethylene Plastics Pipe and Fittings Materials.
19. ASTM E8 - Test Methods for Tension Testing of Metallic Materials.
20. ASTM E23 - Test Methods for Notched Bar Impact Testing of Metallic Materials.
21. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
22. ASTM F714 - Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
23. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

B. American Water Works Association (AWWA):

1. ANSI/AWWA C104/A21.4 – Cement Mortar Lining for Ductile-Iron Pipe and Fittings.
2. ANSI/AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. ANSI/AWWA C110/A21.10 – Ductile-Iron and Gray-Iron Fittings.
4. ANSI/AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. ANSI/AWWA C115/A21.15 – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.
6. ANSI/AWWA C116/A21.16 – Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings.
7. ANSI/AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast.
8. ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings.
9. AWWA C207 – Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
10. ANSI/AWWA C213 – Fusion-Bonded Epoxy Coating for the Interior of Steel Water Pipelines.
11. ANSI/AWWA C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe.
12. ANSI/AWWA C228 – Stainless-Steel Pipe Flange Joints for Water Service – Sizes 2 In. Through 72 In. (50 mm Through 1,800 mm).
13. ANSI/AWWA C303 – Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
14. ANSI/AWWA C500 – Metal-Seated Gate Valves for Water Supply Service.
15. ANSI/AWWA C502 – Dry-Barrel Fire Hydrants.
16. ANSI/AWWA C504 – Rubber-Seated Butterfly Valves.
17. ANSI/AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.
18. ANSI/AWWA C515 – Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
19. ANSI/AWWA C550 – Protective Interior Coatings for Valves and Hydrants.
20. ANSI/AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances.
21. ANSI/AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
22. ANSI/AWWA C700 – Cold-Water Meters – Displacement Type, Metal Alloy Main Case.

23. ANSI/AWWA C701 – Cold-Water Meters – Turbine Type, for Customer Service.
24. ANSI/AWWA C704 – Propeller-Type Meters for Waterworks Applications.
25. ANSI/AWWA C800 – Underground Service Line Valves and Fittings.
26. ANSI/AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm), for Water Transmission and Distribution.
27. ANSI/AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, ¾ In. (19 mm) Through 3 In. (76 mm), for Water Service.
28. ANSI/AWWA C906 – Polyethylene (PR) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks.
29. AWWA Manual M23 – PVC Pipe – Design and Installation.
30. AWWA Manual M55 – PE Pipe – Design and Installation.

C. National Sanitation Foundation International (NSF):

1. NSF/ANSI 61 – Drinking Water System Components – Health Effects.
2. NSF/ANSI 372 – Drinking Water System Components – Lead Content.

1.04 SUBMITTALS

A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:

1. Product data for pipe materials, including pipe size, dimensions, pressure class, and color; valves, and appurtenances.
2. Non-Toxic and Lead-Free Certification: Written statement that all materials in contact with potable water or raw water supply shall be NSF/ANSI 61 compliant, and shall be lead-free, as certified by the Water Quality Association to comply with NSF/ANSI 372.
3. Manufacturer’s installation instructions for pipe materials.
4. Layout drawings for DIP furnished with ring-type integral buried joint restraint.

B. Section 01 78 23 – Operation and Maintenance Data:

1. Operation and maintenance data for valves 4-inches and larger and hydrants.

1.05 GENERAL REQUIREMENTS

A. Pipes, fittings, and materials to be new.

B. Use appropriate equipment and methods for unloading, reloading, hauling and laying pipe as well as proper trench excavation. Use slings with broad, well padded contact surfaces for pipe protection.

C. All pipe of the same type shall be made by the same manufacturer. All fittings of the same type shall be made by the same manufacturer. Pipe manufacturer need not be the same as the fittings manufacturer.

D. Provide labor, equipment, and materials for pipe field testing.

1.06 QUALITY ASSURANCE

- A. Ductile Iron Pipe and Fittings:
 - 1. Tests:
 - a. ASTM E8: Tension Testing of Metallic Materials.
 - b. ASTM E23: Impact Test.
 - 2. Marking: Cast on each pipe length.
 - a. Weight, class, nominal thickness, and casting period.
 - b. Manufacturer's name, year of production, and letters "DI" or "Ductile Iron".

- B. PVC Pipe and Fittings:
 - 1. Tests: ASTM D3034, ANSI/AWWA C900, ASTM D 1784, and ASTM D 1785, as applicable.
 - 2. Marking: Indelible, in each pipe.
 - a. Nominal pipe diameter and cell classification.
 - b. Manufacturer's name or trade name, PVC, ASTM and SDR designation, AWWA pressure class, and date of production.
 - c. Service designation.
 - d. NSF-61 certified.
 - 3. Gasket rings: Marked with the manufacturer's identification, size, year of production, and classes of pipe in which they are to be used.

PART 2 PRODUCTS

2.01 MATERIALS AND FABRICATION

- A. Ductile Iron:
 - 1. Pipe:
 - a. ANSI/AWWA C151/A21.51: ASTM A536, Grade 60-42-10.
 - b. Thickness: Pressure Class 350 for pipes 12" diameter or smaller; Pressure Class 250 for pipes 14" diameter or larger unless otherwise scheduled.
 - 2. Fittings: Cast from ductile iron: ANSI/AWWA C110/A21.10 full body or ANSI/AWWA C153/A21.53 short body.
 - 3. Joints: ANSI/AWWA C111/A21.11:
 - a. Mechanical Joint: 350 psi working pressure.
 - b. Flange: Also ANSI/AWWA C115/A21.15 and ANSI/ASME B16.42, ductile iron; 150 lb. pattern, unless scheduled otherwise.
 - c. Bolts, Tie Bolts, and Nuts:
 - 1) Low carbon steel, ASTM A307.
 - 2) Bolts smaller than ¾-inch: With heavy hex heads for flange and T-head for MJ, and heavy hex nuts.
 - 3) Bolts ¾-inch and larger: With hex heads for flange and T-heads for MJ, and heavy hex nuts.
 - 4) Coating, Exposed Service: Grade B zinc coat per ASTM A153.
 - 5) Coating, Buried Service: Liquid applied fluoropolymer coating matrix consisting of lubricating compounds, UV stabilizers and coloring agents or pigments, heat cured, 0.7 to 1.0 mil total DFT.
 - d. Gaskets for mechanical joint, push-on and flanged joints:

- 1) Conformance: ANSI/AWWA C111/A21.11.
- 2) Material: Synthetic rubber as specified in referenced standard. Natural or reclaimed rubber not acceptable.
- e. Lubricant: Suitable for potable water use and in conformance with ANSI/AWWA C111/A21.11.
4. Joint Restraint: Furnish external mechanical restraint devices, including restrained flange adaptors for exposed piping as specified herein, or integral joint restraints for buried joints if specified herein. Furnish restraint devices where scheduled or noted on Drawings, as specified in Part 2 of this Specification.
 - a. Integral Buried Joint Restraint:
 - 1) Minimum Pressure Rating: 350 psi to 18-inch, 250 psi to 24-inch, 150 psi to 30-inch.
 - 2) Gasket Type: U.S. Pipe Field Lok 350® Gasket, American Ductile Iron Pipe Fast-Grip® Gasket or Engineer reviewed equivalent.
 - 3) Ring Type: U.S. Pipe TR FLEX® Joint, American Ductile Iron Pipe Flex-Ring® Joint, American Ductile Iron Pipe Lok-Ring® Joint, or Engineer reviewed equivalent.
 - 4) For gasket-type integral restraint:
 - a) Pipe manufacturer shall furnish to Contractor two (2) feeler gages capable of determining depth of gasket and presence of metal locking segments.
 - b) Contractor shall wrap bell of each restrained joint with factory furnished tape with words "Restrained Joint".
 - c) Pipe manufacturer shall furnish to Contractor two (2) complete kits of extractor shims and shim holders (slotted and curved steel block used to drive the shims with a hammer) for each size of pipe used.
5. Corrosion Protection:
 - a. Outside Coating (buried or submerged service):
 - 1) Pipe: Bituminous per ANSI/AWWA C151/A21.51.
 - 2) Fittings: Bituminous per ANSI/AWWA C110/A21.10 and ANSI/AWWA C153/A21.53 or fusion-bonded epoxy per ANSI/AWWA C116/A21.16.
 - b. Inside Coating:
 - 1) Pipe: Cement mortar lined with asphaltic seal coat per ANSI/AWWA C104/A21.4.
 - 2) Fittings: Cement mortar lined with asphaltic seal coat per ANSI/AWWA C104/A21.4 or fusion-bonded epoxy per ANSI/AWWA C116/A21.16.
 - c. Polyethylene Encasement:
 - 1) Conformance: ANSI/AWWA C105/A21.5.
 - 2) Material: ASTM D4976, Group 2.
 - 3) Configuration: Seamless tube or sheet.
 - 4) Film Requirements:
 - a) Linear Low-density Polyethylene:

- i. Thickness: 8 mil.
 - ii. Density: 0.910 to 0.935 g/cm³.
 - iii. Tensile Strength: 3,600 psi for 8 mil, ASTM D 882.
 - b) High-density, Cross-laminated Polyethylene:
 - i. Thickness: 4 mil.
 - ii. Density: 0.940 to 0.960 g/cm³.
 - iii. Tensile Strength: 6,300 psi for 4 mil, ASTM D882.
- 5) Color: Weather-resistant black containing not less than 2 percent carbon black.
- 6) Pipe Wrap Tape:
 - a) Material: 10 mil all weather polyvinyl film.
 - b) Durability: Resistant to moisture and corrosive soil.
 - c) Adhesion: Adheres to metal and plastic, and conforms to irregularities in substrate surfaces.
 - d) Elongation: 245 percent.
 - e) Tensile Strength: 30 psi.
 - f) Width: 2 inches.
 - g) Printed Identification Marking: UPC code and mil thickness.
 - h) Acceptable Manufacturer: Northtown Company, or Engineer reviewed equivalent.
- 7) Strapping: Non-metallic, water resistant FS PPP-S-760.
- 8) Install on buried ductile iron piping, fittings, and restraint assemblies in accordance with AWWA C105, unless scheduled otherwise.

B. Polyvinyl Chloride (PVC):

- 1. Water Service Condition:
 - a. Potable Water Service:
 - 1) Pipe manufactured from compounds certified by the National Sanitation Foundation (NSF).
 - 2) Color: Blue pigment.
 - b. Reclaimed Water Service:
 - 1) Color: Purple pigment.
 - 2) Marking: Continuous text, "Reclaimed Water – Do Not Drink".
 - c. Non-Potable Water other than Reclaimed Water Service:
 - 1) Color: White pigment.
- 2. Pipe and Fittings:
 - a. Pipe sizes 4-inch through 60-inch:
 - 1) ANSI/AWWA C900.
 - 2) Pressure class as scheduled.
 - a) Class 235 psi (DR 18) minimum for 12" and smaller if not scheduled or indicated otherwise.
 - b) Class 165 psi (DR 25) minimum for 14" and larger if not scheduled or indicated otherwise.
 - 3) Fittings: Cast from ductile iron; ANSI/AWWA C110/A21.10, full body or ANSI/AWWA C153/A21.53, short body; mechanical joint ANSI/AWWA C111/A21.11, external mechanical restraint devices as specified herein. Encase fittings and all external restraint

assemblies with polyethylene encasement per ANSI/AWWA C105, unless scheduled otherwise.

- b. Pipe sizes 3.5-inch and smaller:
 - 1) Unless otherwise scheduled or shown on the Drawings.
 - a) ASTM D2241.
 - b) 1.5-inch and smaller: SDR 21.
 - c) 2-inch through 3.5-inch: SDR 26.
 - d) Pressure rating as scheduled; 160 psi minimum if not scheduled.
 - 2) If scheduled or shown on the Drawings:
 - a) Schedule 40 and 80 Pipe Dimensions and Workmanship: ASTM D1785.
 - b) Schedule 40 minimum unless otherwise scheduled or shown on Drawings.
 - c) Material: ASTM D1784, Class 12454-B.
 - d) Fittings:
 - i. ASTM D2466, Schedule 40.
 - ii. ASTM D2464, Schedule 80, threaded.
 - iii. ASTM D2467, Schedule 80, socket type.
- 3. Joints:
 - a. Gasket Bell End: ASTM D3139 for plastic pressure pipes using elastomeric seals.
 - b. Gaskets: ASTM F477, elastomeric.
 - c. Solvent Cement Bell End: ASTM D2672.
 - d. Solvent-Cement: ASTM D2564, NSF approved.
 - 1) Use only where specifically scheduled, shown on Drawings or reviewed by Engineer.
- 4. Joint Restraint: Furnish external mechanical restraint devices, including restrained flange adaptors, as specified herein, or integral joint restraints for buried joints if specified herein. Furnish restraint devices where scheduled, noted on Drawings, and where specified in this specification.

C. External Mechanical Restraint Devices:

- 1. Works on principle of multiple wedging action against pipe, which increases its resistance as line pressure increases while maintaining joint flexibility. Set screw devices are not acceptable. Split non-serrated back-up rings behind bells are acceptable. Split serrated restraint rings are not acceptable, except on spigot end of bell restraint harness of C900 PVC pipe up to 12-inches. EBAA Iron Sales, Inc. or Engineer reviewed equivalent.
- 2. Gland: Ductile iron with dimensions which match standard mechanical joint bells per ANSI/AWWA C153/A21.53, ASTM A536, Grade 65-45-12.
- 3. Wedges: Heat-treated ductile iron with minimum Brinell hardness of 370 BHN.
- 4. Wedges tightened during installation via twist-off nuts.
- 5. Devices shall be designed for the following working pressure:
 - a. 250 psi for 18" to 48" DIP, with 2:1 safety factor.
 - b. 350 psi for 3" to 16" DIP, with 2:1 safety factor.

- c. Meets or exceeds standardized pressure rating of host PVC piping.
- 6. Devices shall be designed for the type of pipe material and pipe joint being harnessed.
- 7. An identification number shall be cast into each gland body with the following information: Date and shift of manufacture, and plant location.
- 8. All physical and chemical test results shall be made available to Engineer for review upon request by referencing the identification number.
- 9. Coating for wedges, wedge actuators, bolts, tie bolts, nuts, and related fastener and gripping components:
 - a. Surface Preparation: Cleaner wash, phosphatizing, rinse, and drying.
 - b. Coating: Liquid applied fluoropolymer-matrix consisting of lubricating compounds, UV stabilizers, and coloring agents or pigments. Heat cured. Two coats, 0.7 to 1.0 mil total DFT .
 - c. Low VOC, resin bonded and thermally cured, single film, dry lubricant, primarily formulated for use on fasteners.
 - d. Designed to prevent corrosion and facilitate make-up torque.
 - e. Provide lubricity of coating for proper dispersion of PTFE.
- 10. Coating for Cast Bodies:
 - a. Surface Preparation: Cleaner wash, phosphatizing, rinse, and drying.
 - b. Coating: Electrostatically applied TGIC polyester-based powder. Heat cured. 1.5 to 4.0 mils total DFT.
 - c. Designed to prevent corrosion, impact and UV resistance.
 - d. Appearance: Class 5 (orange peel) PCI smoothness standard; 75% to 85% gloss at 60 degrees per ASTM D523; pinhole free.

D. Couplings:

- 1. Use only where indicated on Drawings or reviewed by Engineer. Do not use where restrained fittings are specified.
- 2. For buried service, furnish factory-applied fusion-bonded epoxy coating in accordance with AWWA C213, and corrosion-resistant alloy bolts equivalent to Dresserloy.
- 3. Shall meet AWWA C219: Described by reference to couplings manufactured by Dresser Industries, Inc., Bradford, PA; equivalent couplings by Ford Meter Box, JCM Industries, Romac Industries, or by other manufacturers may be used:
 - a. Dresser Style 38 for exposed steel, cast iron, and ductile iron pipe, unless indicated otherwise on Drawings or scheduled.
 - b. Dresser Style 253 cast iron couplings for buried steel, cast iron, ductile iron, and asbestos cement pipe, unless indicated otherwise on Drawings.
 - c. Dresser Style 40 long couplings where long couplings are indicated.
 - d. Dresser Style 62 Type reducing couplings where reducing couplings are indicated.
 - e. Dresser Style 162 couplings for transition between different pipe materials.
 - f. Dresser Style 63 expansion coupling where expansion coupling is indicated; type as indicated on Drawings or scheduled.
 - g. Dresser Style 227 and 128 coupling with flanged adaptor where indicated on Drawings.

- h. Dresser Style 131 dismantling joint.

E. Tapping Saddles and Service Lines:

- 1. Service Lines ¾-inch to 3-inch:
 - a. Conformance: AWWA C901.
 - b. Resin: High density polyethylene (HDPE) PE4710 having minimum cell classification 445474C/E as rated by the Plastic Pipe Institute (PPI) and in conformance with ASTM D3350.
 - c. Wall Thickness Design:
 - 1) ASTM D2239, controlled inside diameter, SDR-9 unless scheduled otherwise, or
 - 2) ASTM D2737, copper pipe size, SDR-9, unless scheduled otherwise,
 - 3) Contractor's option unless scheduled otherwise,
 - 4) Minimum Pressure Rating: 150 psi at 73 degrees F.
- 2. Joints:
 - a. Compression fittings.
 - b. Compatible with heavy duty copper service fittings.
- 3. Tapping Saddles:
 - a. AWWA C900 PVC Host Pipe:
 - 1) Body Material: Bronze or brass.
 - 2) Strap Material: Type 304L stainless steel.
 - 3) Style: Two strap.
 - 4) Rated Working Pressure: At least 200 psig.
 - 5) Outlet Seal: EPDM O-ring.
 - 6) Tap Size: As indicated on Drawings.
 - 7) Conformance: Applicable portions of AWWA C800.
 - 8) Non-Toxic: NSF/ANSI 61 certified.
 - 9) Lead Free: Certified by the Water Quality Association to comply with NSF/ANSI 372.
 - 10) Acceptable Manufacturers: Mueller BR2S, Romac 202BS, Ford 202BSD, or Engineer reviewed equivalent.
 - b. Ductile Iron Host Pipe:
 - 1) Body Material: Ductile iron, ASTM A536 with 10 to 12 mil nylon or epoxy coating.
 - 2) Strap Material: Type 304L stainless steel.
 - 3) Style: Two strap.
 - 4) Rated Working Pressure: At least 200 psig.
 - 5) Outlet Seal: EPDM O-ring.
 - 6) Tap Size: As indicated on Drawings.
 - 7) Conformance: Applicable portions of AWWA C800.
 - 8) Non-Toxic: NSF/ANSI 61 certified.
 - 9) Lead Free: Certified by the Water Quality Association to comply with NSF/ANSI 372.
 - 10) Acceptable Manufacturers: Mueller DR2S, Romac 202N, Ford FCD202, or Engineer reviewed equivalent.
- 4. Corporation Stops:
 - a. Material: Bronze or brass.

- b. Style: Ball type, suitable for use with tapping machine.
 - c. Rated Working Pressure: At least 300 psig.
 - d. Size: As indicated on Drawings.
 - e. Conformance: AWWA C800.
 - f. Threaded Connections: Compatible with tapping saddle.
 - g. Non-Toxic: NSF/ANSI 61 certified.
 - h. Lead Free: Certified by the Water Quality Association to comply with NSF/ANSI 372.
5. Curb Stop Valves:
- a. Material: Cast brass.
 - b. Style: Ball type, full port.
 - c. Rated Working Pressure: 300 psi.
 - d. Size: As indicated on Drawings.
 - e. Conformance: AWWA C800.
 - f. Connections: Compatible with service line material.
 - g. Ball: Fluorocarbon coated brass ball.
 - h. Seats: EPDM molded seats with stainless steel reinforcing rings, bi-directional flow.
 - i. Stem Seals: Two EPDM O-rings.
 - j. Tee-Head and Stem: Solid, one piece.
 - k. Tee-Head Rotation: Standard stops on body to permit quarter-turn only.
 - l. Non-Toxic: NSF/ANSI 61 certified.
 - m. Lead-Free: Certified by the Water Quality Association to comply with NSF/ANSI 372.
 - n. Curb Box: Cast iron box and lid with brass pentagon plug, arch style with foot piece, telescoping upper piece for grade adjustment.

2.02 APPURTENANCES

- A. Resilient Wedge Gate Valves 2”-24” (Buried Service):
- 1. Size as shown on Drawings.
 - 2. AWWA C509 or AWWA C515.
 - 3. Mueller A-2361 series or Engineer reviewed equivalent.
 - 4. Fully unobstructed, oversize flow way. The sealing mechanism is withdrawn from the flow way in a full open position. No pockets in bottom of flow way to trap sediment or debris.
 - 5. Anti-friction washers above and below the thrust collar portion of stem to reduce friction.
 - 6. Triple O-ring seals on the stem, two above and one below the thrust collar to protect from contamination.
 - 7. A symmetrical rubber encapsulated disc with no exposed iron.
 - 8. Forged bronze stem for added strength and reliability.
 - 9. Coating: AWWA C550 and NSF-61 certified epoxy coating on all interior and exterior cast iron surfaces 10 mils nominal thickness.
 - 10. 2 inch AWWA operating nut.
 - 11. Ends: Mechanical joint, or as required for pipe or as shown on Drawings.
 - 12. Threaded operator: Open left (counter clock-wise) unless scheduled otherwise.

13. Lead Free: Furnish certification as specified in Submittals section of this specification.

B. Tapping Sleeves:

1. Minimum working pressure: 250 psi.
2. Welded, fabricated type 304 stainless steel body with the following features:
 - a. Buna-N rubber gasket, gridded, 360 degree pipe coverage.
 - b. Type 304 stainless steel bolts and nuts.
 - c. Flat face steel flange per AWWA C228, Class D 150 lb. pattern per AWWA C207.
 - d. Test Plug: $\frac{3}{4}$ -inch NPT, no-lead brass.
3. Ford FTSS, Smith-Blair 663, or JCM 432.
4. Sizes as shown on Drawings.

C. Tapping Valves:

1. Minimum working pressure: 150 psi.
2. Sizes as shown on Drawings.
3. Mueller Type T-2360 Resilient Wedge Gate Valve; Mechanical Joint on outlet side and Flange End on opposite side, or Engineer reviewed equivalent.
4. AWWA C509.
5. AWWA C550 and NSF-61 certified epoxy coating on all interior and exterior ferrous metal surfaces 10 mils nominal thickness.
6. Operator: 2-inch AWWA nut.]

D. Pipe Marking Systems: Refer to Section 31 23 33 – Trenching and Backfilling.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Install as indicated on Drawings.
2. Trenching, Backfilling, and Compacting: Section 31 23 33 – Trenching and Backfilling.
3. Pipe cutting measurement taken at site.
4. Clean all pipe, accessories, and appurtenances before use. Thoroughly clean interior of each section of pipe after installing it in trench.
5. Protection of stored materials: Section 01 66 01 – Product Delivery, Storage, and Handling Requirements.
6. Securely close the end of the pipe at the end of each day or whenever the work ceases with a watertight seal.
7. Take precautions necessary to prevent uplift and floating of the pipe prior to backfilling.

B. Jointing and Assembling, General:

1. Manufacturer's recommendations.
2. Lubricants: Vegetable soap solution suitable for use on potable water systems.

3. Prevent entrance of soil and other contaminants.
4. Use mechanical or push-on for exterior locations.

C. Delivery, Handling, and Storage of PVC Pipe:

1. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer.
2. Inspect each pipe shipment prior to unloading to see if the load has shifted or otherwise been damaged. Notify Engineer immediately if more than immaterial damage is found. Check each pipe shipment for quantity and proper pipe size, color, and type.
3. Off-load and handle pipe in accordance with AWWA M23 and AWWA C605, and all of the Pipe Supplier's guidelines.
4. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
5. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
6. Lower pipe from trucks carefully. Do not drop pipe.
7. Mark as rejected and remove at once from the work any pipe showing a crack or which has received a blow that could have caused an incident fracture, even though no such fracture can be seen.
8. Any scratch or gouge greater than 10 percent of the wall thickness will be considered significant and shall be rejected unless determined acceptable by the Engineer.
9. Store and place pipe lengths on level ground. Store pipe at the job site in the unit packaging provided by the Pipe Supplier. Exercise caution to avoid compression, damage, or deformation to the ends of the pipe. Keep the interior of the pipe, as well as all end surfaces, free from dirt and foreign matter.
10. Handle and support pipe using woven fiber pipe slings or approved equivalent. Exercise care when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
11. If pipe is to be stored for periods longer than ninety (90) days, the pipe and gaskets should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe shall be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.
12. Store and stack pipe in accordance with the Pipe Supplier's guidelines.

D. PVC Pipe Joint Assembly:

1. Conformance to AWWA C605 – Underground Installation of Polyvinyl Chloride (PCV) Pressure Pipe and Fittings for Water:
 - a. Assemble PVC pipe in conformance with AWWA C605, section 5.5.2 – Joint Assembly, which states:
 - 1) “Pipe spigot ends are pre-marked at the factory with a circumferential insertion line. This line references how far the spigot should be inserted into the adjoining PVC pipe bell. Field-cut spigot

ends shall be marked and beveled to match the manufacturer's insertion line. Pipe-to-pipe joints shall be assembled only to the insertion line. After assembly, the insertion line shall remain visible and be nearly flush with the lip of the adjoining PVC pipe bell. Joints assembled beyond the insertion line shall be considered over-assembled and may result in damaging stresses or leakage.”

2. Field Quality Control to Prevent Over-Assembly (Over-Insertion):
 - a. If a joint is found to be over-inserted, Contractor shall expose previously assembled joints until properly assembled joints are found. All over-inserted joints shall be properly re-assembled.
 - b. Contractor is permitted to use mechanical bell stop devices that meet the following criteria:
 - 1) Designed specifically to handle pipe insertion forces to prevent insertion beyond the marked insertion line.
 - 2) Incorporates a resilient expansion retention spring that allows for pipe expansion and contraction.
 - 3) Ebaa Iron Mega-Stop™ Series 5000 Bell Protection System, or Engineer reviewed equivalent.
- E. PVC Pipe Tapping:
1. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605 and as specified herein. Tapping shall be performed only with use of tap saddles or sleeves. **NO DIRECT TAPPING WILL BE PERMITTED.** Tapping shall be performed in accordance with the applicable sections for Saddle Tapping in accordance with Uni-Pub-08.
 2. All connections requiring a larger diameter than that recommended by the Pipe Supplier, shall be made with a pipe connection as specified and indicated on the Drawings.
 3. Equipment used for tapping shall be made specifically for tapping PVC pipe:
 - a. Tapping bits shall be slotted “shell” style cutters, specifically made for heavy-walled PVC pipe and designed to retain the coupon. “Hole saws” made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
 - b. Manually operated or power operated drilling machines may be used.
 4. Taps may be performed while the pipeline is filled with water and under pressure (“wet” tap,) or when the pipeline is not filled with water and not under pressure (“dry” tap).
- F. Clean all lines by repeated flushings after installations.
- G. Disinfection: Section 33 13 13 – Disinfection of Domestic Water Systems.
- H. Pipe Sleeves:
1. For all pipes passing through concrete or masonry.
 2. Install before concrete is placed where practical.
 3. Sleeve seal: Watertight, modular sealing element when sleeve is placed in slabs with one side against soil.

- I. Buried Pipe Anchorage:
 - 1. Furnish and install thrust blocking, anchors, joint restraint devices, or other acceptable means of preventing pipe movement whether indicated or not for:
 - a. Unlugged bell and spigot or all unflanged tees.
 - b. Y branches.
 - c. Bends deflecting 22-1/2 degrees or more.
 - d. Plugs.
 - e. Fittings in fills or unstable ground.
 - f. Above grade or exposed piping.
 - 2. Concrete thrust blocking:
 - a. Install so joints are accessible for repair.
 - b. Install as shown on Drawings for buried pipe unless otherwise scheduled or reviewed by Engineer.
 - c. Use bond breaker, such as 8 mil polyethylene sheets, between concrete and surfaces of all piping, fittings, and appurtenances.
- J. Valves: Installed as shown on Drawings with valve boxes and blocking.
- K. Fire Hydrants: As indicated on Drawings with concrete supports.

3.02 FIELD QUALITY CONTROL

- A. Ductile Iron Pipe: AWWA C600, except as specified otherwise herein.
- B. PVC Pipe and Fusible PVC Pipe: AWWA C605 for pressure rated, and AWWA Manual M23, except as specified otherwise herein.
- C. HDPE Pipe: AWWA C901, AWWA C906, AWWA Manual M55, and PPI Handbook of Polyethylene Pipe, except as specified otherwise herein.
- D. All pipes and fittings tested in presence and to the satisfaction of the Engineer.
- E. Test Conditions:
 - 1. Working Pressure: See Schedule.
 - 2. Medium: **Water only. Do not test PVC, FPVC or CPVC with air** because pipe failure from pressurized air may result in explosive shards.
 - 3. Unless otherwise scheduled, perform test at 50% greater than working pressure, or 150 psi, whichever is greater, for two hour minimum.
- F. Procedure:
 - 1. Coordinate pressure testing with filling, disinfection and flushing procedures as submitted in the Disinfection Plan submittal specified in Section 33 13 13 – Disinfection of Domestic Water Systems.
 - 2. Disconnect fixtures, equipment and accessories which may be damaged by test pressure.
 - 3. Plug ends as required.

4. No installation will be accepted unless the leakage is less than the number of gallons per hour as determined by the following formula, except HDPE waterlines:
 - a. $L = (N) (D) (P^{0.5}) / 133,200$
 - b. Where:
 - 1) L = allowable leakage in gallons per hour.
 - 2) N = length of pipeline tested in feet.
 - 3) D = nominal diameter of pipe in inches.
 - 4) P = average test pressure during test, psig.
5. HDPE Waterlines: Unless scheduled otherwise, perform test at 50% greater than working pressure.
 - a. Fill Phase: Fill the restrained test section completely with water. Evacuate air from all high points.
 - b. Initial Expansion Phase: After the piping and water have equalized to a common temperature, gradually pressurize test section to test pressure, and maintain test pressure for three (3) hours. During the initial expansion phase, HDPE pipe will expand slightly. Add additional water to maintain pressure. It is not necessary to monitor the amount of water added during the initial expansion phase.
 - c. Test Phase: Immediately following the initial expansion phase, reduce test pressure by 10 psi, and stop adding test water. If test pressure remains steady (within 5% of the target value) for one (1) hour, no leakage is indicated.
 - d. Depressurization Phase: Gradually release the test pressure by controlling the release of water.
 - e. Total Test Duration: Limit the time the pipe is pressurized at test pressure to eight (8) hours. If pipe must be pressurized again to test pressure, depressurize pipe first and allow it to relax for at least eight (8) hours before repressurizing.
 - f. Supervision: Do not leave the test section unsupervised at any time during leak testing.
6. If leakage is indicated, locate and repair leaks.
7. Retest repaired joints, pipes, and fittings until system complies with above criteria for allowable leakage.

G. Sequence for Pressure Testing:

1. If an isolation valve is used to isolate a segment of pipe for pressure testing, the piping on both sides of the valve shall be installed with backfill and compaction fully completed on both sides of the valve for a minimum distance of 250 feet.

3.03 SCHEDULE

A. The waterline shall be constructed using any combination of the following pipe materials, unless noted otherwise in the Contract Documents for specific areas:

1. PVC Pipe:
 - a. C900, Pressure Class 235, DR 18.
2. Ductile Iron Pipe (DIP):

- a. 12" and smaller: Pressure Class 350.
- B. Buried Ductile Iron Piping, Fittings, and All External Restraint Assemblies; and Buried Metal Valves and All Metal Appurtenances: Install with polyethylene encasement.

END OF SECTION

SECTION 33 13 13

DISINFECTION OF DOMESTIC WATER SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide personnel, equipment, and supplies, disinfect and test all potable water systems, including water treatment systems, waterlines, water storage reservoirs, water wells, and new building system including flushing at completion of treatment.

1.02 RELATED REQUIREMENTS

- A. American Waterworks Association Standards:
 - 1. AWWA B100 – Granular Filter Material.
 - 2. AWWA B300 – Hypochlorites.
 - 3. AWWA C651 – Disinfection Water Mains.
 - 4. AWWA C652 – Disinfection of Water Storage Facilities.
 - 5. AWWA C653 – Disinfection of Water Treatment Plants.
 - 6. AWWA C654 – Disinfection of Wells.
 - 7. AWWA C655 – Field Dechlorination.

1.03 RELATED WORK

- A. National Sanitation Foundation International (NSF):
 - 1. NSF/ANSI 60 – Drinking Water Treatment Chemicals – Health Effects.

1.04 QUALITY ASSURANCE

- A. Regulatory Agency Requirements: Comply with applicable state requirements.

1.05 SUBMITTALS

- A. Disinfection Plan:
 - 1. Submittal Requirements:
 - a. Prior to filling water system with water, submit electronic file of Disinfection Plan to Engineer for review and comment. Flushing, disinfection and sampling procedures shall be in accordance with the referenced AWWA standards.
 - b. Address Engineer's comments and submit electronic file of Final Disinfection Plan to Engineer and NMED Drinking Water Bureau pursuant to NMAC 20.7.10.201 B.(3), NMAC 20.7.10.201 T.(2) and NMAC 20.7.10.400 F.
 - c. Do not fill system with water until NMED has approved the plan.

- d. After disinfection has been completed and prior to placing components into service, submit Certification of Disinfection of Water Facilities in the form of a notarized affidavit to the Engineer and NMED Drinking Water Bureau confirming that disinfection of project components has been completed according to the referenced AWWA standards. Owner will withhold payment of the disinfection portion of the affected Work items until Contractor successfully submits Certification.
 - e. Do not place the system into service until NMED has accepted the Certification.
2. Proposed Actions Described in Plan:
- a. How pipes and tanks will be filled with source water. Coordinate availability of water with Owner.
 - b. Identify the sequence of filling system, chlorinating water, pressure testing and flushing system. Follow procedures specified in the referenced AWWA disinfection standards. Reference which AWWA method of chlorination will be followed.
 - c. If system will be disinfected, tested and flushed in segments, identify where and in what sequence the segments will be isolated and tested. Be aware that elevation differences may require breaking up a pipeline into segments with no more than approximately 50 psi (115 vertical feet) pressure difference within the segment.
 - d. Identify points in the system where water will be introduced, chlorine added (or swabbed), initial and residual chlorine concentrations measured, flushing water blown off, final chlorine residuals measured after flushing, and bacteriological sample points.
 - e. Identify method of measuring chlorine residual in the field.
 - f. Identify the bacteriological test lab that will be used, test method, and sampling, chain of custody, and transportation procedures.
 - g. Describe how highly chlorinated flush water will be properly disposed.
- B. Test Reports: Submit two (2) copies as follows:
- 1. Disinfection report, include:
 - a. Date issued
 - b. Project name and location
 - c. Treatment contractor's name, address, and phone number
 - d. Type and form of disinfectant used
 - e. Time and date of disinfectant injection start
 - f. Time and date of disinfectant injection completion
 - g. Test locations
 - h. Initial and 24-hour disinfectant residuals in ppm for each outlet tested
 - i. Time and date of flushing start
 - j. Time and date of flushing completion
 - k. Disinfectant residual after flushing in ppm for each outlet tested
 - 2. Bacteriological report, include:
 - a. Date issued
 - b. Project name and location
 - c. Laboratory's name, certification number, address, and phone number

- d. Time and date of water sample collection
- e. Name of person collecting samples
- f. Test locations
- g. Time and date of laboratory test start
- h. Coliform bacteria test results for each outlet tested
- i. Certification that water conforms or fails to conform to bacterial standards of Federal Safe Drinking Water Act.
- j. Microbiologist's signature

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect against damage and contamination.
- B. Maintain caution labels on hazardous materials.
- C. Maintain storage room dry and with temperatures as uniform as possible between 60 degrees F (15.6 degrees C) and 80 degrees F (26.7 degrees C).

1.07 PROTECTION

- A. Provide necessary signs, barricades, and notices to prevent any person from accidentally consuming water or disturbing system being treated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Disinfectant:
 - 1. Free chlorine; liquid, powder, tablet or gas: Per AWWA B300.
 - 2. Certified compliant with NSF/ANSI Standard 60.

PART 3 EXECUTION

3.01 INSPECTION

- A. Prior to starting Work verify that domestic water system is completed and cleaned.
- B. Do not start Work until conditions are satisfactory.

3.02 SYSTEM TREATMENT

- A. Water Distribution and Transmission System: Per AWWA C651. Including disinfecting existing systems after repair.
- B. Water Treatment Reservoir: Per AWWA C652.
- C. Water Storage Plants: Per AWWA C653.
- D. Water Wells: Per AWWA A100 and AWWA C654.

- E. New Building Water System: Per local or State Plumbing Code.
- F. Granular Media Filters: Per AWWA, B100.
- G. Field Dechlorination: Per AWWA C655.

3.03 BACTERIOLOGICAL TEST

- A. Take samples where and when as required by referenced standards or codes.
- B. Analyze water samples in accordance with “Standard Methods for the Examination of Water and Wastewater”, latest edition, published by American Water Works Association.
- C. Analyze water samples as otherwise required or allowed by referenced standards or codes.
- D. Employ the services of an independent test laboratory certified by the New Mexico Environment Department Drinking Water Bureau to perform all bacteriological testing.
- E. Payment for bacteriological testing of water wells shall be as specified in Section 33 21 00 – Water Well.
- F. Payment for bacteriological testing for all other domestic water systems is considered incidental Work to the Contract Documents’ bid items.

3.04 DISPOSAL OF HEAVILY CHLORINATED WATER

- A. Test heavily chlorinated water for chlorine residual in accordance with Appendix A of the AWWA C651.
- B. Chlorine residual of water being disposed of, shall be neutralized in accordance with AWWA C655 – Field Dechlorination to meet residual acceptable for domestic use.
- C. Dispose of water flushed from water main, after neutralization to designated receiving drainage. Coordinate with Engineer.

3.05 FAILURE OF DISINFECTION AND/OR BACTERIOLOGICAL TESTS

- A. If test results do not comply with criteria required by referenced standards or codes, system shall undergo disinfection in accordance with Section 5.2 of the AWWA C651.

END OF SECTION

**CERTIFICATION OF DISINFECTION
OF WATER FACILITIES**

I, _____, hereby certify that the facilities constructed under the project _____ were disinfected in accordance with the Disinfection Plan submitted under Specification Section 33 13 13 – Disinfection of Domestic Water Systems and with the following American Water Works Association (AWWA) standards:

C651 – AWWA Standard for Disinfecting Water Mains

C652 – AWWA Standard for Disinfection of Water-Storage Facilities

C653 – AWWA Standard for Disinfection of Water Treatment Plants

C654 – AWWA Standard for Disinfection of Wells

Contractor: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Notary Certification:

State of _____

(County) of _____

Signed or attested before me on _____ by _____

SEAL

Notary Public

My Commission Expires: _____

SECTION 40 27 00

PROCESS PIPE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipes, materials, and appurtenances for all buried and exposed treatment plant, lift station, process, pump station, and sewage force main piping and similar facilities.
- B. Installation of necessary valves and accessories.
- C. Pipe anchors and supports.
- D. Pipe insulation.

1.02 GENERAL REQUIREMENTS

- A. Pipes, Fittings, and Materials to be New.
- B. Use Appropriate Equipment Methods for Unloading, Reloading, and Handling the Pipe.
- C. Pipe, Fittings, and Appurtenances of the Same Type: Made by the same manufacturer.
- D. Provide Labor, Equipment and Materials for Field Pipe Testing.
- E. All interior valves to have flange connections except where otherwise indicated.

1.03 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
 - 1. ASTM A153 – Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - 2. ASTM A183 – Carbon Steel Track Bolts and Nuts.
 - 3. ASTM A307 – Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
 - 4. ASTM A536 – Ductile Iron Castings.
 - 5. ASTM B633 – Electrodeposited Coatings of Zinc on Iron and Steel.
 - 6. ASTM C335 – Steady-State Heat Transfer Properties of Pipe Insulation.
 - 7. ASTM C356 – Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
 - 8. ASTM C411 – Hot-Surface Performance of High-Temperature Thermal Insulation.
 - 9. ASTM C547 – Mineral Fiber Pipe Insulation.
 - 10. ASTM C553 – Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

11. ASTM C585 – Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing.
12. ASTM D1784 – Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
13. ASTM D1785 – Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
14. ASTM D2241 – Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
15. ASTM D2464 – Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
16. ASTM D2466 – Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
17. ASTM D2467 – Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
18. ASTM D2564 – Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
19. ASTM D2672 – Joints for IPS PVC Pipe Using Solvent Cement.
20. ASTM D3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
21. ASTM D3350 – Polyethylene Plastics Pipe and Fittings Materials.
22. ASTM E8 – Tension Testing of Metallic Materials.
23. ASTM E23 – Notched Bar Impact Testing of Metallic Materials.
24. ASTM E84 – Surface Burning Characteristics of Building Materials.
25. ASTM F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
26. ASTM F714 – Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
27. ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

B. American Water Works Association (AWWA):

1. ANSI/AWWA C104/A21.4 – Cement Mortar Lining for Ductile-Iron Pipe and Fittings.
2. ANSI/AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. ANSI/AWWA C110/A21.10 – Ductile-Iron and Gray-Iron Fittings.
4. ANSI/AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. ANSI/AWWA C115/A21.15 – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.
6. ANSI/AWWA C116/A21.16 – Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings.
7. ANSI/AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast.
8. ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings.
9. AWWA C200 – Steel Water Pipe-6 In. (150 mm) and Larger.
10. AWWA C203 – Coal-Tar Protective Coatings and Linings for Steel Water Pipe.
11. AWWA C207 – Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
12. ANSI/AWWA C208 – Dimensions for Fabricated Steel Water Pipe Fittings.
13. ANSI/AWWA C209 – Cold-Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections, and Fittings.

14. ANSI/AWWA C213 – Fusion-Bonded Epoxy Coating for the Interior of Steel Water Pipelines.
15. ANSI/AWWA C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe.
16. ANSI/AWWA C228 - Stainless-Steel Pipe Flange Joints for Water Service, Sizes 2 In. Through 72 In. (50 mm Through 1,800 mm).
17. ANSI/AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances.
18. ANSI/AWWA C604 – Installation of Buried Steel Water Pipe, 4-In. (100mm) and Larger.
19. ANSI/AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
20. ANSI/AWWA C606 – Grooved and Shouldered Joints.
21. ANSI/AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm), for Water Transmission and Distribution.
22. ANSI/AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4-In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks.
23. AWWA Manual M23 – PVC Pipe – Design and Installation.
24. AWWA Manual M55 – PE Pipe – Design and Installation.

C. National Sanitation Foundation International (NSF):

1. NSF/ANSI 61 – Drinking Water System Components – Health Effects.
2. NSF/ANSI 372 – Drinking Water System Components – Lead Content.

1.04 SUBMITTALS

A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:

1. Product Data for pipe materials, including pipe size, dimensions, pressure class, restraint devices, and appurtenances.
2. Manufacturer’s installation instructions.
3. Layout Drawings for DIP furnished with ring-type integral buried joint restraint.
4. Layout Drawings for pipe furnished with grooved and shouldered joints showing locations of rigid and flex style joints.
5. Non-Toxic and Lead-Free Certification: Written statement that all materials in contact with potable water or raw water supply shall be NSF/ANSI 61 compliant, and shall be lead-free, as certified by the Water Quality Association to comply with NSF/ANSI 372.

1.05 QUALITY ASSURANCE

A. Ductile Iron Pipe and Fittings:

1. Tests:
 - a. ASTM E8: Tension Testing of Metallic Materials.
 - b. ASTM E23: Impact Test.
2. Marking: Cast on each pipe length.
3. Weight, class, nominal thickness, and casting period.
4. Manufacturer’s name, year of production, and letters “DI” or “Ductile Iron”.

- B. PVC Pipe and Fittings:
 1. Tests: ASTM D3034, ANSI/AWWA C900, ASTM D1784, and ASTM D1785, as applicable.
 2. Marking: Indelible, in each pipe.
 - a. Nominal pipe diameter and cell classification.
 - b. Manufacturer's name or trade name, PVC, ASTM and SDR designation, AWWA pressure class, and date of production.
 - c. Service designation.

PART 2 PRODUCTS

2.01 MATERIALS AND FABRICATION

- A. Ductile Iron:
 1. Pipe:
 - a. ANSI/AWWA C151/A21.51: ASTM A536, Grade 60-42-10.
 - b. Thickness: Pressure Class 350 for pipes 12" diameter or smaller; Pressure Class 250 for pipes 14" diameter or larger unless otherwise scheduled.
 2. Fittings: Cast from ductile iron: ANSI/AWWA C110/A21.10 full body or ANSI/AWWA C153/A21.53 short body.
 3. Joints: ANSI/AWWA C111/A21.11:
 - a. Mechanical Joint: 350 psi working pressure.
 - b. Flange: Also ANSI/AWWA C115/A21.15 and ANSI/ASME B16.42, ductile iron; 150 lb. pattern, unless scheduled otherwise.
 - c. Bolts, Tie Bolts, and Nuts:
 - 1) Low carbon steel, ASTM A307.
 - 2) Bolts smaller than 3/4": With heavy hex heads for flange and T-head for MJ, and heavy hex nuts.
 - 3) Bolts 3/4" and larger: With hex heads for flange and T-heads for MJ, and heavy hex nuts.
 - 4) Coating, Exposed Service: Grade B zinc coat per ASTM A153.
 - 5) Coating, Buried Service: Liquid applied fluoropolymer coating matrix consisting of lubricating compounds, UV stabilizers and coloring agents or pigments, heat cured, 0.7 to 1.0 mil total DFT.
 - d. Gaskets for mechanical joints, push-on and flanged joints:
 - 1) Conformance: ANSI/AWWA C111/A21.11.
 - 2) Material: Synthetic rubber as specified in referenced standard. Natural or reclaimed rubber not acceptable.
 - 3) High Temperature Air Service Piping: Viton rubber rated for 350°F.
 - e. Lubricant: In conformance with ANSI/AWWA C111/A21.11.
 4. Joint Restraint: Furnish external mechanical restraint devices, including restrained flange adaptors for exposed piping as specified herein, or integral joint restraints for buried joints if specified herein. Furnish restraint devices where scheduled or noted on Drawings, as specified in Part 2 of this Specification.
 - a. Integral Buried Joint Restraint:
 - 1) Minimum Pressure Rating: 350 psi to 18", 250 psi to 24", 150 psi to 30".

- 2) Gasket Type: U.S. Pipe Field Lok 350® Gasket, American Ductile Iron Pipe Fast-Grip® Gasket, or Engineer reviewed equivalent.
- 3) Ring Type: U.S. Pipe TR FLEX® Joint, American Ductile Iron Pipe Flex-Ring® Joint, American Ductile Iron Pipe Lok-Ring® Joint, or Engineer reviewed equivalent.
 - a) For gasket-type integral restraint:
Pipe manufacturer shall furnish to Contractor two (2) feeler gages capable of determining depth of gasket and presence of metal locking segments.
 - b) Contractor shall wrap bell of each restrained joint with factory furnished tape with words "Restrained Joint".
 - c) Pipe manufacturer shall furnish to Contractor two (2) complete kits of extractor shims and shim holders (slotted and curved steel block used to drive the shims with a hammer) for each size of pipe used.
5. Thickness: Pressure Class 350 for pipes 4-12" and Pressure Class 250 for pipes ≥ 14" unless otherwise scheduled.
6. Corrosion Protection:
 - a. Outside Coating (buried or submerged service):
 - 1) Pipe: Bituminous per ANSI/AWWA C151/A21.51.
 - 2) Fittings: Bituminous per ANSI/AWWA C110/A21.10 and ANSI/AWWA C153/A21.53 or fusion-bonded epoxy per ANSI/AWWA C116/A21.16.
 - b. Outside Coating, Exposed Service (not submerged): Prepare surface with SSPC-SP6-commercial blast cleaning and shop coat with rust inhibiting modified alkyd shop primer equivalent to Tnemec Series 4 Versare Primer or Sherwin-Williams Kem Kromik Universal Metal Primer. Field coat in accordance with Section 09 97 01 – Industrial Coatings, Service Conditions F8, unless scheduled otherwise.
 - c. Outside Coating, Exposed Service (submerged): Prepare surface with SSPC-SP10-near-white blast cleaning and shop coat with rust inhibiting modified alkyd shop primer equivalent to Tnemec Series 4 Versare Primer or Sherwin-Williams Kem Kromik Universal Metal Primer. Field coat in accordance with Section 09 97 01 – Industrial Coatings, Service Conditions F1, unless scheduled otherwise.
 - d. Inside Coating, Process Liquid Service: Cement mortar lining with bituminous seal coat, ANSI/AWWA C104/A21.4, unless scheduled otherwise.
 - e. Inside Coating, Process Air Service: Epoxy lining, two coats, 24 mil minimum total dry film thickness.
 - f. Glass Lining for inside coating when scheduled or shown on Drawings: Porcelain enamel coating, 10-15 mils total thickness, applied in 2 layers to substrate which has been blasted to white metal condition per SSPC-SP5; Coating material fired at nominal oven temperature of 1400 F°.
 - g. Inside Coating: Ceramic epoxy lining for inside coating when scheduled or shown on Drawings:
 - 1) Epoxy Material: Factory-installed amine cured novalac epoxy, minimum 20% by volume ceramic quartz pigment.

- 2) Applied to pipe prepared by abrasive blast cleaning at coating factory.
 - 3) Applied to pipe interior, 6" of spigot end exterior and gasket socket.
 - 4) 40 mil nominal thickness, 6 mils nominal thickness at spigot ends and gasket sockets.
 - 5) Successfully pass nondestructive 2,500 volt holiday test.
 - 6) Acceptable Manufacturer: Protecto 401 by Induron Coatings, (205) 324-9584, or Engineer reviewed equivalent.
- h. Polyethylene Encasement:
- 1) Conformance: ANSI/AWWA C105/A21.5.
 - 2) Material: ASTM D4976, Group 2.
 - 3) Configuration: Seamless tube or sheet.
 - 4) Film Requirements:
 - a) Linear Low-density Polyethylene:
 - i. Thickness: 8 mil.
 - ii. Density: 0.910 to 0.935 g/cm³.
 - iii. Tensile Strength: 3,600 psi for 8 mil, ASTM D 882.
 - b) High-density, Cross-laminated Polyethylene:
 - i. Thickness: 4 mil.
 - ii. Density: 0.940 to 0.960 g/cm³.
 - iii. Tensile Strength: 6,300 psi for 4 mil, ASTM D 882.
 - 5) Color: Weather-resistant black containing not less than 2 percent carbon black.
 - 6) Pipe Wrap Tape:
 - a) Material: 10 mil all weather polyvinyl film.
 - b) Durability: Resistant to moisture and corrosive soil.
 - c) Adhesion: Adheres to metal and plastic, and conforms to irregularities in substrate surfaces.
 - d) Elongation: 245 percent.
 - e) Tensile Strength: 30 psi.
 - f) Width: 2".
 - g) Printed Identification Marking: UPC code and mil thickness.
 - h) Acceptable Manufacturer: Northtown Company, or Engineer reviewed equivalent.
 - 7) Strapping: Non-metallic, water resistant FS PPP-S-760.
 - 8) Install on buried ductile iron piping, fittings, and restraint assemblies in accordance with AWWA C105, unless scheduled otherwise.

B. Polyvinyl Chloride (PVC):

1. Pipe and fittings:
 - a. Pipe sizes 4" through 60":
 - 1) ANSI/AWWA C900.
 - 2) Pressure class as scheduled; Class 235 psi (DR 18) minimum if not scheduled otherwise.
 - 3) Fittings: Cast from ductile iron; ANSI/AWWA C110/A21.10, full body or ANSI/AWWA C153/A21.53, short body; mechanical joint ANSI/AWWA C111/A21.11, external mechanical restraint devices as specified herein. Encase fittings and all external restraint assemblies with polyethylene encasement per ANSI/AWWA C105/A21.5, unless scheduled otherwise.

- b. Pipe sizes 3.5" and smaller:
 - 1) Unless otherwise scheduled or shown on the Drawings.
 - a) ASTM D2241.
 - b) 1.5" and smaller: SDR 21.
 - c) 2" through 3.5": SDR 26.
 - d) Pressure rating as scheduled; 160 psi minimum if not scheduled.
 - 2) If scheduled or shown on the Drawings:
 - a) Schedule 40 and 80 Pipe Dimensions and Workmanship: ASTM D1785.
 - b) Schedule 40 minimum unless otherwise scheduled or shown on Drawings.
 - c) Material: ASTM D1784, Class 12454-B.
 - d) Fittings:
 - i. ASTM D2466, Schedule 40.
 - ii. ASTM D2464, Schedule 80, threaded.
 - iii. ASTM D2467, Schedule 80, socket type.
- 2. Joints:
 - a. Gasket Bell Ends: ASTM D3139, lubricant assembled.
 - b. Gaskets: ASTM F477, elastomeric.
 - c. Solvent Cement: ASTM D2564 only where specifically allowed by Engineer, schedules or Drawings.
 - d. Solvent Cement Bell End: ASTM D2672.
- 3. Joint Restraint: Furnish external mechanical restraint devices, including restrained flange adaptors, as specified herein, or integral joint restraints for buried joints if specified herein. Furnish restraint devices where scheduled, noted on Drawings, and where specified in this specification.

C. External Mechanical Restraint Devices:

- 1. Works on principle of multiple wedging action against pipe, which increases its resistance as line pressure increases while maintaining joint flexibility. Set screw devices are not acceptable. Split non-serrated back-up rings behind bells are acceptable. Split serrated restraint rings are not acceptable, except on spigot end of bell restraint harness of C900 PVC pipe up to 12". EBAA Iron Sales, Inc. or Engineer reviewed equivalent.
- 2. Gland: Ductile iron with dimensions which match standard mechanical joint bells per ANSI/AWWA C153/A21.53, ASTM A536, Grade 65-45-12.
- 3. Wedges: Heat-treated ductile iron with minimum Brinell hardness of 370 BHN.
- 4. Wedges tightened during installation via twist-off nuts.
- 5. Devices shall be designed for the following working pressure:
 - a. 250 psi for 18" to 48" DIP, 2:1 safety factor.
 - b. 350 psi for 3" to 16" DIP, 2:1 safety factor.
 - c. Meets or exceeds standardized pressure rating of host PVC piping.
- 6. Devices shall be designed for the type of pipe material and pipe joint being harnessed.
- 7. An identification number shall be cast into each gland body with the following information: Date and shift of manufacture, and plant location.
- 8. All physical and chemical test results shall be made available to Engineer for review upon request by referencing the identification number.

9. Coating for wedges, wedge actuators, bolts, tie bolts, nuts, and related fastener and gripping components:
 - a. Surface Preparation: Cleaner wash, phosphatizing, rinse, and drying.
 - b. Coating: Liquid applied fluoropolymer-matrix consisting of lubricating compounds, UV stabilizers, and coloring agents or pigments. Heat cured. Two coats, 0.7 to 1.0 mil total DFT.
 - c. Low VOC, resin bonded and thermally cured, single film, dry lubricant, primarily formulated for use on fasteners.
 - d. Designed to prevent corrosion and facilitate make-up torque.
 - e. Provide lubricity of coating for proper dispersion of PTFE.
10. Coating for Cast Bodies:
 - a. Surface Preparation: Cleaner wash, phosphatizing, rinse, and drying.
 - b. Coating: Electrostatically applied TGIC polyester-based powder. Heat cured. 1.5 to 4.0 mils total DFT.
 - c. Designed to prevent corrosion, impact and UV resistance.
 - d. Appearance: Class 5 (orange peel) PCI smoothness standard; 75% to 85% gloss at 60 degrees per ASTM D523; pinhole free.

D. Grooved and Shouldered Joints:

1. Conformance: ANSI/AWWA C606.
2. Rated Working Pressure: Not less than that specified for the pipe.
3. Application:
 - a. Exposed and buried ductile iron pipe, 3" to 36", Class 53 or heavier, in lieu of flanged or mechanical joints and fittings.
 - b. Exposed black or galvanized steel pipe, in lieu of flanged joints and fittings.
 - c. Or where indicated on Drawings.
4. Mechanical Couplings:
 - a. Design: Housing and gaskets shall be designed to fully seat and seal by visual verification without need to measure bolt torque.
 - b. Groove: Cutting, rolling and dimensions in conformance with ANSI/AWWA C606.
 - c. Rigid/Flex Style Joints: Locations as indicated on Drawings or as indicated on accepted Shop Drawings.
 - d. Housing: Two or more segments of ductile iron, ASTM A536, grade 65-45-12.
 - e. Housing Factory Coating:
 - 1) Exposed Service: 1.5 mil alkyd phenolic primer, enamel top coat.
 - 2) Buried or Immersion Service: Coal tar epoxy.
 - f. Gaskets: Pressure-responsive synthetic rubber, grade as recommended by manufacturer as suitable to meet fluid and temperature requirements. All materials in contact with potable water shall be NSF 61 certified.
 - g. Coupling Bolts and Nuts:
 - 1) Exposed Service: Heat treated carbon black steel per ASTM A183, 110,000 psi tensile strength, with zinc plating per ASTM B633.
 - 2) Buried or Immersion Service: Type 304 stainless steel.

5. Ductile Iron Fittings:
 - a. Material: Ductile iron, ASTM A536, grade 65-45-12.
 - b. Center-to-End Dimensions and Wall Thickness: Conform to ANSI/AWWA C110/A21.10.
 - c. Rated Working Pressure:
 - 1) 3" to 12": 350 psi.
 - 2) 14" to 36": 250 psi.
 - d. Grooved Ends: ANSI/AWWA C606.
 - e. Factory Coating:
 - 1) Exposed Service: 1.5 mil alkyd phenolic primer, enamel top coat.
 - 2) Buried or Immersion Service: Coal tar epoxy.
 - 3) Lining: Cement mortar lining ANSI/AWWA C104/A21.4.
6. Connection to Adjacent Valves and Flanged Piping:
 - a. Furnish valves with factory grooved ends conforming to ANSI/AWWA C606.
 - b. Or furnish flange adapter with grooves conforming to ANSI/AWWA C606.
7. Acceptable Manufacturers: Victaulic Company or Engineer reviewed equivalent.
8. Installation: Follow manufacturer's recommended grooving and assembly instructions.
9. Manufacturer's Field Service Representative:
 - a. Provide a minimum of one (1) visit to job site to train Contractor's field personnel in the proper use of grooving tools, application of groove, and product installation.
 - b. Provide a minimum of one (1) visit to job site to review installation. Contractor shall remove and replace any improperly installed products.

E. Couplings:

1. Use only where indicated on Drawings or reviewed by Engineer. Do not use where restrained fittings are specified.
2. For buried or exposed service, furnish factory applied fusion-bonded epoxy coating in accordance with ANSI/AWWA C213, and corrosion-resistant alloy bolts equivalent to Dresserloy or Type 316 stainless steel.
3. For air service, furnish high temperature EPDM or Viton gaskets rated for 250°F or higher.
4. Shall meet ANSI/AWWA C219: Described by reference to couplings manufactured by Dresser Industries, Inc., Bradford, PA; equivalent couplings by Ford Meter Box, JCM Industries, Romac Industries, or by other manufacturers may be used:
 - a. Dresser Style 38 for exposed steel, cast iron, and ductile iron pipe unless indicated otherwise on Drawings or scheduled.
 - b. Dresser Style 253 cast iron couplings for buried steel, cast iron, ductile iron, and asbestos cement pipe, unless indicated otherwise on Drawings.
 - c. Dresser Style 40 long couplings where long couplings are indicated.
 - d. Dresser Style 62 Type reducing couplings where reducing couplings are indicated.

- e. Dresser Style 162 couplings for transition between different pipe materials.
 - f. Dresser Style 63 expansion coupling where expansion coupling is indicated; type as indicated on Drawings or scheduled.
 - g. Dresser Style 227 and 128 coupling with flanged adaptor where indicated on Drawings.
 - h. Dresser Style 131 dismantling joint.
- F. Pipe Sleeves for Carrier Pipes 22" Diameter or Smaller:
- 1. Manufactured from non-metallic, non-corrosive, thermoplastic material.
 - 2. Formed to have a water stop and anchor plate at least 4" larger than the main outside diameter and position, unless otherwise specified, in the middle of the sleeve body.
 - 3. Seal shall provide electrical insulation barriers between the pipe and wall.
 - 4. Link-Seal Century Model CS, Thunderline Corporation, or Innerlynx Model PWS.
- G. Pipe Sleeves for Carrier Pipes 24" Diameter and Larger:
- 1. Steel sleeves with full circle waterstop collar continuously welded on both sides hot dipped galvanized or thermally bonded plastic coating.
 - 2. Link-Seal Model WS or Innerlynx Model Gal-vo-plast®.
- H. Mechanical Seals:
- 1. Watertight, synthetic rubber seal composed of interlocking links joined by bolts, modular sealing element when sleeve is placed in slabs with one side against soil or as shown on Drawings.
 - 2. Rubber links shall completely fill the annular space between pipe and sleeve to provide water tight seal capable of resisting a hydrostatic pressure of 20 psi.
 - 3. Pipe Sleeve Installations: Link-Seal LS for sleeve model CS or Innerlynx Model IL-C.
 - 4. Core Drilled Installations: Link-Seal LS or Innerlynx IL-C.
- I. Wall Pipe:
- 1. Material: DIP or cast iron pipe.
 - 2. Seep Ring: Continuously welded or integrally cast intermediate flange.
 - 3. Size, Thickness and Ends: To match connecting piping.
- J. Flex PVC Vinyl Chemical Tubing:
- 1. Material: Braided clear PVC tubing with polyester reinforcement.
 - 2. Inside Diameter: As indicated or scheduled on the Drawings.
 - 3. Wall Thickness: Equivalent to Herco-Braid Series 0512, standard duty.
 - 4. Working Pressure Rating: 125 psi at 70°F.
 - 5. Joints: PVC hose barb insert fittings with type 304 stainless steel hose clamps.
 - 6. Joint Locations: Do not install joints within containment piping.
- K. PVC Containment Piping:
- 1. Description: Schedule 80 PVC rigid non-metallic conduit (RNC) in accordance with Carlon. Schedule 80 RNC Extra Heavy Wall EPC-80.
 - 2. Size: As indicated or scheduled on the Drawings.

3. Bends: Long sweep elbows in accordance with Carlon standard radius (16" radius for 4" diameter conduit).
4. Joints: Solvent socket weld.

L. Tapping Saddles:

1. AWWA C900 PVC Host Pipe:
 - a. Body Material: Bronze or brass.
 - b. Strap Material: Type 304L stainless steel.
 - c. Style: Two strap.
 - d. Rated Working Pressure: At least 200 psig.
 - e. Outlet Seal: EPDM O-ring.
 - f. Tap Size: As indicated on Drawings.
 - g. Conformance: Applicable portions of AWWA C800.
 - h. Acceptable Manufacturers: Mueller BR2S, Romac 202BS, Ford 202BSD, or Engineer reviewed equivalent.
2. Ductile Iron Host Pipe:
 - a. Body Material: Ductile iron, ASTM A536 with 10 to 12 mil nylon or epoxy coating.
 - b. Strap Material: Type 304L stainless steel.
 - c. Style: Two strap.
 - d. Rated Working Pressure: At least 200 psig.
 - e. Outlet Seal: EPDM O-ring.
 - f. Tap Size: As indicated on Drawings.
 - g. Conformance: Applicable portions of AWWA C800.

M. Tapping Sleeves:

1. Minimum working pressure: 250 psi.
2. Welded, fabricated type 304 stainless steel body with the following features:
 - a. Buna-N rubber gasket, gridded, 360 degree pipe coverage.
 - b. Type 304 stainless steel bolts and nuts.
 - c. Flat face steel flange per AWWA C228, Class D 150 lb. pattern per AWWA C207.
 - d. Test Plug: 3/4" NPT, no-lead brass.
3. Ford FTSS, Smith-Blair 663 or JCM 432.
4. Sizes as shown on Drawings.

2.02 ACCESSORIES

A. Pipe Insulation:

1. Phenolic Resin Bonded Fiberglass:
 - a. Property Requirements: ASTM C547.
 - b. Maximum Apparent Thermal Conductivity: 0.25 Btu.inch/hour, sq.ft. at 100°F, per ASTM C335.
 - c. Dimension Requirements: ASTM C585.
 - d. Temperature Limit: 850°F per ASTM C411.
 - e. Fire Safety: ASTM E84.
 - f. Maximum Linear Shrinkage: 2 %, per ASTM C356.
 - g. Thickness: Thickness shall be as listed in the following table, unless indicated otherwise in the Contract Documents:

| Nominal Pipe Diameter | Insulation Thickness |
|-----------------------|----------------------|
| 1/2" | 1/2" |
| 3/4" | 1" |
| 1" | 1" |
| 1-1/2" | 1" |
| 2" | 1-1/2" |
| 2-1/2" | 2" |
| 3" | 2" |
| 4" | 2-1/2" |
| 6" and larger | 3" |

2. Waterproofed with Aluminum Roll Jacketing:
 - a. T/3003 or T/5005 alloy, gauge 0.016.
 - b. Stucco embossed pattern with moisture barrier, continuously laminated across the full width of the jacket.
 - c. Factory attached moisture barrier: One mil polyethylene film with a layer of 40# virgin kraft paper.
 - d. Moisture Absorption: Less than 5% by weight, ASTM C553.
3. Expanded Metal Wrap:
 - a. Hot-dip galvanized steel, gauge 9, 3/4", No. 16-18.
 - b. Weight per square foot: 0.51 lb.
 - c. Diamond flattened pattern.
 - d. Only where specifically indicated on Drawings.

B. Supports and Anchors:

1. Clevis Hangers: FS WW-H-171E, as appropriate or as shown on Drawings.
2. Hanger Rods: ASTM A307, Grade R.
3. Fabricated Supports: Galvanized steel with stainless steel hardware.
4. Beam Clamps: FS WW-H-171E, as appropriate or as shown on Drawings.
5. Concrete Inserts:
 - a. Individual: FS WW-H-171E, as appropriate or as shown on Drawings.
 - b. Continuous:
 - 1) Channel 12 gauge, galvanized 1-5/8" x 1-5/8".
 - 2) Anchor lugs on 4" centers, 2 minimum.
6. Wall Supports and Frames: FS WW-H-171E, as appropriate or as shown on Drawings.
7. Floor Supports:
 - a. 6" and smaller: FS WW-H-171E, Type 38.
 - b. Larger than 6": FS WW-H-171E, Type 36 or 39.
8. Other: As indicated on Drawings.

C. Pressure Gauges: As specified in Section 40 73 13 – Pressure Gauges, and as shown on Drawings.

D. Pipe Marking Systems for Buried Utilities: Refer to Section 31 23 33 – Trenching and Backfilling.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Install as indicated on Drawings.
2. Trenching, Backfilling and Compacting: Section 31 23 33 – Trenching and Backfilling.
3. Pipe cutting measurement taken at site.
4. Clean all pipe, accessories, and appurtenances before use.

B. Flanged Joints:

1. Flange faces to bear uniformly on the gasket and bolts tightened in progressive crisscross order.
2. Tighten flange bolts with a properly calibrated torque wrench set at the following ranges unless otherwise agreed by the Engineer:

| Flange Size | Torque Range (ft-lbs) |
|-----------------|-----------------------|
| 4" through 24" | 75 – 90 |
| 30" through 36" | 100 – 120 |
| >36" | 120 - 150 |

3. All flange bolts at each connection to be uniformly tightened to the specified range.

C. Other Joints:

1. Manufacturer's recommendations.
2. Lubricants: Vegetable soap solution.
3. Solvent cementing of PVC pipe only where scheduled.

D. Clean all lines by repeated flushings after installation.

E. Pipe Sleeves:

1. For pipes passing through concrete or masonry.
2. Install before concrete is placed where practical.
3. Use on all penetrations for line sizes 20" or smaller unless otherwise shown on Drawings or indicated on Schedule.

F. Mechanical Seals:

1. To be used with pipe sleeves and core drilled penetrations.
2. Use only where indicated on Drawings or Schedule for wall penetrations.

G. Wall Pipe:

1. Only where indicated on Drawings or scheduled, provide wall pipe for pipes passing through concrete walls.
2. Install when concrete is placed.
3. Provide tapped holes where wall pipes with flanges are flush with concrete.

H. Floor Penetrations:

1. Install pipe sleeve through floor sized to provide 0.25" to 1.0" annular space around pipe and maximum of 1" projection above top of floor.
2. Pipe sleeve shall be heavy wall PVC or galvanized steel.

3. Pipe sleeve shall contain a 1" wide collar located in center of floor slab.
4. Fill annular space with watertight resilient seal: Type A urethane sealant with joint backer, as specified in the Elastomeric Sealants section.
5. Use on all penetrations unless otherwise shown on Drawings or indicated on Schedule.

I. Anchoring and Supports:

1. Where needed or indicated on Drawings.
2. Section 05 50 10 – Anchor Bolts and Chemical Anchors.
3. Maximum Support Spacing:

| Nominal Pipe Size, inches | Maximum Span, Water Service, feet | |
|---------------------------|-----------------------------------|-------------------|
| | Schedule 40 and 80 Rigid PVC | Schedule 40 Steel |
| 0.5 and smaller | 3 | 7 |
| 0.75 | 3 | 7 |
| 1 | 3.5 | 7 |
| 1.5 | 4.5 | 9 |
| 2 | 5 | 10 |
| 3 | 6 | 12 |
| 4 | 6.5 | 14 |
| 6 | 7.5 | 17 |
| 8 | 8 | 19 |
| 10 | 8.5 | 22 |
| 12 | 9.5 | 23 |
| 14 | 10 | 25 |
| 16 | 10.5 | 27 |
| 18 | 11 | 28 |
| 20 | 11.5 | 30 |
| 24 | 12.5 | 32 |

J. Buried Pipe Anchorage:

1. Furnish and install thrust blocking, anchors, joint restraint devices, or other acceptable means of preventing pipe movement at all of the following locations, whether shown on the Drawings or not:
 - a. Unlugged bell and spigot or all unflanged tees.
 - b. Y branches.
 - c. Bends deflecting 22-1/2 degrees or more.
 - d. Plugs.
 - e. Fittings in fills or unstable ground.
 - f. Above grade or exposed structure.
2. Concrete thrust blocking:
 - a. Install thrust blocking so joints are accessible for repair.
 - b. Install as shown on Drawings for buried pipe unless otherwise scheduled.
 - c. Provide bond breaker, such as 8 mil polyethylene sheet, between concrete and surfaces of all piping, fittings, and appurtenances.

K. Valves: Installed as shown on Drawings with valve boxes and blocking.

- L. Pipe Insulation:
 1. Where indicated on Drawings.
 2. Expanded metal wrap: Where indicated on Drawings.
- M. Gas Lines: In full conformance with the requirements and standards of the gas utility to which the gas lines are to be connected and/or to which the gas lines become a part.

3.02 FIELD QUALITY CONTROL

- A. Ductile Iron Pipe: AWWA C600, except as specified or shown otherwise.
- B. Steel Pipe: AWWA C604, except as specified or shown otherwise.
- C. PVC Pipe, and Fusible PVC Pipe: AWWA C605 for pressure rated, and AWWA Manual M23, except as specified or shown otherwise.
- D. HDPE Pipe: AWWA C906, AWWA Manual M55, and PPI Handbook of Polyethylene Pipe, except as specified or shown otherwise.
- E. All pipes and fittings tested in presence and to the satisfaction of the Engineer.
- F. Test Conditions:
 1. Low Pressure Air Piping: 10 psi air, check with soap solution, bubble tight.
 2. High Pressure Air Piping: 100 psi air, check with soap solution, bubble tight.
 3. Exposed Pressurized Water and Wastewater Lines: 150 psi hydrostatic test, no visible leakage for 1 hour.
 4. **Do not test PVC, FPVC or CPVC with air** because pipe failure from pressurized air may result in explosive shards.
 5. Buried Force Mains Except HDPE: Hydrostatic test at 150% of shut-off head for lift station pumps or 75 psi, whichever is greater, for two-hour minimum; allowable leakage shall be less than that determined by the following formula:
 - a. $L = (N) (D) (P^{0.5}) / 133,200$
 - b. Where:
 - 1) L = allowable leakage in gallons per hour.
 - 2) N = length of pipeline tested in feet.
 - 3) D = nominal diameter of pipe in inches.
 - 4) P = average test pressure during test, psig.
 6. Buried pressure-rated and restrained piping subject to gravity flow and submergence up to 30': 50 psi hydrostatic test for two hours minimum; allowable leakage shall be less than that determined by the formula specified for buried force mains except HDPE.
 7. Other Piping: No detectable leakage under normal or simulated operating conditions.
- G. Procedure:
 1. Disconnect fixture, equipment, and accessories which may be damaged by test pressure.
 2. Plug ends as required.
 3. If leakage is indicated, locate and repair leaks.

4. Retest repaired joints, piping, and fittings until system complies with above criteria for allowable leakage.

3.03 PIPE SCHEDULE

- A. As indicated on Drawings.
- B. Buried Ductile Iron Piping, Fittings, and all External Restraint Assemblies; and Buried Metal Valves and all Metal Appurtenances: Install with polyethylene encasement.

END OF SECTION

SECTION 40 27 02.09

MISCELLANEOUS VALVES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install all miscellaneous valves specified herein.

1.02 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples: Product data for all items listed in PART 2 PRODUCTS, except for hose bibbs and plug cocks.
- B. Section 01 78 23 – Operation and Maintenance Data: Operation and Maintenance Manuals for all items listed in Part 2 PRODUCTS, except for hose bibbs, plug cocks, stop gates, gate valves under 4", and elastomeric check valves.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Same manufacturer for each type of valve throughout where practical.
- B. Manufacturer's name or initials and working pressure ratings cast on valve body.

2.02 DESIGN REQUIREMENTS

- A. General: Unless otherwise indicated, use valves suitable for 125 minimum psi WOG and 150°F.
- B. Lead Free: All materials in contact with potable water shall be lead-free, as certified by the Water Quality Association to comply with NSF/ANSI 372, and shall be NSF 61 compliant.
- C. Globe Valves 2-1/2" and Smaller: Bronze, rising stem, inside screw, renewable composition disc, screwed or flanged ends.
- D. Air/Vacuum and Air Release Valves:
 - 1. Water Service Air Valves:
 - a. Functions - furnish type and size of water service air valves as scheduled or as noted on Drawings:
 - 1) Air Release Valves: Releases air pockets during system operation.
 - 2) Air/Vacuum Valves: Exhausts large quantities of air at system start-up, and introduces air to protect system from vacuum.
 - 3) Combination Air Valves (CAV): Releases air pockets during system

- operation, exhausts large quantities of air at system start-up, and introduces air to protect system from vacuum.
- b. Conformance: AWWA C512, NSF/ANSI 61 certified for drinking water, and NSF/ANSI 372 certified lead-free by WQA.
 - c. Pressure Rating: 150 psi, unless otherwise scheduled or shown on Drawings.
 - d. Body, Cover, and Baffle: Cast iron or ductile iron.
 - e. Interior and Exterior Coating: Fusion bonded epoxy in accordance with AWWA C550.
 - f. Float and Trim: Type 316 stainless steel.
 - g. Seat: Buna-N or Viton.
 - h. 2" Inlet and Smaller: NPT threaded inlet and outlet.
 - i. 3" and 4" Inlet: NPT or 125 lb. pattern flange inlet, NPT outlet, as indicated on Drawings.
 - j. 6" and 8" Inlet: 125 lb. pattern flange inlet, NPT outlet.
 - k. Piping Appurtenances: Inlet stainless steel ball or gate valve and vent return leg piping with 1/4" mesh stainless steel bug screen fastened to outlet, unless shown otherwise on Drawings.
 - l. Drain Valve Inspection Piping: Install stainless steel ball valve and stainless steel fittings on air valve body lower drain tap in accordance with manufacturer's Operation and Maintenance Manual to facilitate performance testing.
2. Training of Owner's Personnel: Manufacturer's Field Service Representative shall provide 4 hours of training to Owner's personnel on operation and maintenance in accordance with the requirements of Section 01 79 01 – Manufacturer's Instruction of Owner's Personnel.
 3. Insulation Blanket for Valves and Piping Inside Air Valve Stations:
 - a. Service: Flexible, removable insulation blanket around valves and piping located inside buried air valve manholes.
 - b. Outer and Inner Jackets: 17.0 oz./sq. yd. silicone impregnated fiberglass cloth.
 - c. Insulation:
 - 1) Material: Fiberglass, 9 pcf density.
 - 2) Thermal Conductivity: $k = 0.4 \text{ BTU/inch/hr/SF/F degree at } 300^{\circ}\text{F}$
 - 3) Thickness: 1-1/2".
 - d. Fabrication Requirements:
 - 1) Blanket construction shall be double-sewn lock stitch with a minimum of seven stitches per inch. Raw jacket edges shall have a tri-fold Silicone cloth binding. No raw-cut jacket edges shall be exposed. Stitching shall be done with Teflon-coated fiberglass thread.
 - 2) Blanket design shall encase the unit to be insulated.
 - 3) To maintain uniform thickness, stainless steel quilting pins shall be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation fiber.
 - 4) Blanket insulation shall use a belt system fastening method: 1" wide webbed nylon belting with a 1" wide "D" ring fastener sewn onto the

belt. The belts shall be left long enough to facilitate easy tightening.
Heat the ends of the belts to prevent fraying.

5) Fabricate blanket to enclose valves and valve handles.

E. Hose Bibbs:

1. Body: Brass or bronze.
2. Hose Connection Spout: 3/4".
3. Packing: Nitrile or EPDM.
4. Seat Washer: Nitrile.
5. Wheel Handle: Aluminum or painted steel.
6. Maximum Pressure: 125 psi.
7. Maximum Temperature: 120°F.

F. Bronze Ball Valves for Exposed Metal Pipe Installations, 1/4" to 4":

1. Body and Adapter: Lead free copper silicon alloy.
2. Style: Two-piece, standard port.
3. Pressure Rating:
 - a. 600 psi WOG non-shock at 300°F for 1/4" to 3".
 - b. 400 psi WOG non-shock at 250°F for 4".
4. Ball: Type 316 stainless steel.
5. Seat: Carbon/glass filled or enhanced PTFE.
6. Body Seal: PTFE.
7. Stem: Type 316 stainless steel, blowout-proof.
8. Stem Packing: Glass reinforced, PTFE.
9. Stem Packing Nut: Brass, ASTM B16, C36000, adjustable packing gland.
10. Lever Handle and Nut: Zinc plated carbon steel.
11. Handle Sleeve: Vinyl.

G. Silent Check Valves:

1. Globe-style, cast iron body with ANSI Class 125 lb. flanges; body to have teardrop profile to minimize pressure loss across valve.
2. ASTM B584, C83600 bronze plug, guide bushings, and seat.
3. Plug to have integral shaft for centering plug throughout its length of travel.
4. Type 316 stainless steel spring designed to exert sufficient closing force such that the plug begins opening at a differential pressure of 0.5 psi and fully opens at a flow velocity of 4 fps.
5. Designed to begin closing as flow velocity diminishes and shall be fully closed at zero velocity to prevent flow reversal.
6. Allowable leakage: per AWWA C508-93: Section 5.2.2.3.
7. APCO Series 600, Val-Matic Series 1800, or Golden-Anderson/Empire Speciality Valve Figure 280/288.

- H. Butterfly Valves, Exposed Service:
1. Size: As indicated on Drawings.
 2. Conformance: AWWA C504 Rubber-Seated Butterfly Valves, pressure Class 150 B 250 B.
 3. Body: Short body flanged, ANSI Class 125 flange drilling, unless indicated otherwise on Drawings.
 4. Working Pressure: 150 psig.
 5. Materials of Construction:
 - a. Body: Cast iron or ductile iron.
 - b. Disc: Cast iron or ductile iron, streamlined, secured to shaft with stainless steel pins.
 - c. Valve shaft: Type 304 stainless steel.
 - d. Key: AISI C1045 cold drawn steel.
 6. Resilient Seat: Buna-N (NBR) bonded seat in body or disc, shall mate to a Type 316 stainless steel seat ring.
 7. Coating: Fusion bonded epoxy inside and outside, AWWA C550, 12 to 20 mils, one coat.
 8. Actuator:
 - a. Factory assembled with valve by valve manufacturer.
 - b. Lever Actuators: Furnish with valves up to 6" diameter, unless indicated otherwise on Drawings.
 - c. Handwheel Actuators: Furnish on 8" diameter and larger valves, conform to AWWA C504, unless indicated otherwise on Drawings and as specified herein.
 - 1) Size actuator such that the rim pull required to operate valve shall not exceed 40 lbs.
 - 2) Actuator Type: Traveling nut.
 - d. Electric Motor Actuators: Furnish when scheduled or indicated on Drawings. Refer to specification for Electric Valve Operators.
 - e. Manual Valves Located More Than 5' Above Operating Floor: Furnish enclosed gear operator equipped with cast iron chainwheel and sufficient length of nickel plated carbon steel chain to reach within 4' of operating floor.

- I. Sampling Faucet:
1. Type: MIP x No Thread Plain End.
 2. Size: 3/4".
 3. Body Material: Lead-free brass.
 4. Rated Pressure: 125 psi W.O.G.
 5. Handle: Tee-handle.

2.03 PROTECTIVE COATING

- A. Factory enamel paint unless specified otherwise.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Manufacturer's recommendations.
- B. Per code or best trade or industry practice.
- C. As indicated on Drawings.

3.02 SCHEDULE

- A. As indicated on Drawings.

END OF SECTION

SECTION 40 60 10

INSTALLATION, TESTING, AND CALIBRATION OF INSTRUMENTATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation and testing of instrument circuits.
- B. Installation, calibration, and testing of instruments.
- C. Test equipment for testing and calibration of instrumentation.

1.02 SYSTEM REQUIREMENTS

- A. For purposes of this section, “instrument” means:
 - 1. A transmitter which measures a process variable and produces an analog signal, such as 4 to 20 mA, 1 to 5V, or similar.
 - 2. Other analog devices which produce or utilize mA or similar signals, such as indicators and isolators.
 - 3. A switch which measures a pressure, temperature, or similar, in an analog fashion but produces a discrete output. This does not include float switches.
- B. Instrumentation refers to the entire system of instruments and associated indicators, circuits, and accessories.
- C. Provide minor pipe, fittings, adapters, valves, tubing, supports, and accessories to make a complete, operating installation for each instrument, whether shown on the Drawings or not.
- D. Provide labor to accomplish a complete, tested, calibrated, and correctly operating installation.

1.03 SUBMITTALS

- A. Assemble calibration reports into ring binders, filed in order of Tag Number. Place project information on each binder. Submit three copies. The information in the reports having been field verified, this submittal will be reviewed only for completeness.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 INSTALLATION OF CIRCUITS

- A. Use type and size of wire or cable specified in Section 26 05 19 – Low Voltage Wire and Cables, or as shown on the Drawings, whichever is larger.
- B. Color code and label every wire end as specified in Section 26 05 19 – Low Voltage Wire and Cables.
- C. Run instrumentation circuits unbroken, such as from instrument to Surge Protective Device (SPD) to indicator to PLC, with no intermediate connection except:
 - 1. Where terminal boards are shown on the Drawings.
 - 2. Where terminal boards with appropriate enclosures are proposed by the Contractor and allowed in writing by the Engineer.
- D. Connect to remote terminal unit (RTU), remote control panel (RCP), programmable logic controller (PLC), or similar controller I/O terminals only after testing specified below is complete.
- E. Maintain physical separation between DC instrumentation circuits and all AC circuits.
- F. The quantity, type, and AWG of wire and cable called for on the Drawings is for facility equipment as designed. If equipment is furnished which requires a greater quantity of, different type or larger AWG wire or cable than called for, then furnish the correct quantity, type and AWG plus appropriate conduit at no additional cost to the Owner. Submit proposed changes to Engineer for review.

3.02 TESTING OF CIRCUITS

- A. Conduct testing to verify that analog circuits and associated DC power circuits are properly installed and connected, that there are no shorts, and that there are no unintentional grounds on the signal conductors. Lift intentional grounds from shields and verify that there are no unintentional grounds on the shields.
- B. Connect circuits to the terminals of the controller and connect shield grounds.
- C. Provide all test equipment.

3.03 INSTALLATION OF INSTRUMENTS

- A. Coordinate installation of instruments such that instruments are installed by appropriately skilled workers and such that all necessary labor and materials are included in the Bid. For example, determine the appropriate trade for the installation of a 24" electromagnetic flow element versus the transmitter and the installation of a

conductivity analyzer probe versus the transmitter and assign the work accordingly. Also determine which trade will provide and install such adapters and hardware as needed for a complete, working installation. For another example, determine in advance which trades will install thermal wells versus temperature transmitter elements.

- B. Follow recommendation and instructions of equipment manufacturer in addition to requirements of Drawings and Specifications in handling and installation of instrumentation equipment.
- C. **Cleaning:** Before assembly or installation, thoroughly clean equipment of temporary protective coatings and foreign materials. After installation of equipment, clean external surfaces of oil, grease, dirt, or other foreign material.
- D. Mount instrumentation equipment approximately where shown on the Drawings. Propose exact locations to the Engineer in advance of mounting. Mount with pipe stands, brackets, or strut as specified and as shown on the Drawings. If not detailed on the Drawings, propose bracket details in the field. Provide floor stands where instruments are located away from walls or other building structure. Provide manufacturers' mounting adapters as needed.
- E. **Painting:** Paint ferrous, custom or field-fabricated brackets, stands, and miscellaneous mounting members as specified in Division 9. Painting is not required for aluminum, galvanized steel, or stainless steel.
- F. **Transmitters Which are Separate from their Sensing Element:**
 - 1. Transmitters not in a building:
 - a. Mount the transmitter so the display faces north.
 - b. If not practical to face north, so demonstrate to the Engineer, then face east.
 - c. Only with written approval from the Engineer, face the display south or west.
 - 2. Mount the transmitter at a convenient height (approximately 64" centerline) above the finished walking surface (grade).
 - 3. Mount the transmitter so it is easily accessible for reading, testing, and calibration.
 - 4. Provide manufacturer-furnished or recommended cable for connection of sensing element to transmitter.
- G. **Transmitters Which are Integral with their Sensing Element:**
 - 1. If piping run or structure permits, mount the transmitter between 18" and 72" above grade and so the transmitter is easily accessible for reading, testing, and calibration.
 - 2. Where the Drawings show transmitters more than 72" above grade or where the piping run or structures require mounting the transmitter more than 72" above grade, locate the transmitter where access by means of a ladder is convenient.

3. Transmitters in a building:
 - a. If the transmitter is mounted high and is adjustable, face the display downward, angled for operator convenience.
 - b. If the transmitter is at an intermediate height and is adjustable, adjust angle for operator convenience.
 - c. If the transmitter is mounted low and is adjustable, face the display upward, angled for operator convenience.
4. Transmitters not in a building:
 - a. If the transmitter is mounted high and is adjustable, face the display downward, angled for operator convenience.
 - b. If the transmitter is mounted at an intermediate height, if practical, mount the transmitter so the display faces north. If not practical to face north, so demonstrate to the Engineer, then face east. Only with written approval from the Engineer, face the display south or west.
 - c. If the transmitter is mounted low, face upward unless shown otherwise on the Drawings. Provide sun shade similar to the requirements below but with a hinged portion on top to protect the display from the sun. Mount sun shade to a bracket which is independent of the process pipe or vessel.

H. Local Indicators:

1. Mount the indicator at a convenient height (approximately 64" centerline) above the finished walking surface (grade).
2. Mount the indicator so it is easily accessible for reading, testing, and calibration.
3. Face the display the same as required for separately mounted transmitters.

I. Sun Shades:

1. Provide sun shades for all LED and LCD displays of separately mounted transmitters and local indicators which are not within a building and which are not facing north, whether sun shades are shown on the Drawings or not. Also provide sun shades for other transmitters where noted on the Drawings.
2. The purpose of sun shades is to protect the readout from direct sun and to allow easier reading of the display by an operator. Fabricate and install accordingly. An acceptable design is 14 gage aluminum plate with two bends formed in it and mounted so it extends three to four inches beyond the front of the transmitter or indicator on the left, top, and right, complete with a top-hinged flap which completely shades the display except when lifted by hand. Make all corners smooth, especially the upper two corners. Mount so the sun shade stands off from the enclosure of the transmitter or indicator to allow for air circulation. Mount with SS hardware. Other designs may be proposed for review by the Engineer.

J. Nameplates:

1. Install an engraved nameplate to identify each instrument.
2. If text is not shown on the Drawings, show function and tag number of instrument.

3.04 CALIBRATION OF INSTRUMENTS

- A. Provide all test and calibration equipment. Unless equipment is new for this project, provide current National Institute of Standards and Technology traceable calibration information for it.
- B. Calibrate the following instruments in place and demonstrate correct calibration as installed, under simulated operating conditions. For calibration range, see Instrumentation and Control Wiring Schedule and Tag List. If not shown, see Drawings. If not shown, obtain information from Engineer during construction.
 - 1. Temperature transmitters.
 - 2. Pressure transmitters.
 - 3. Level transmitters.
 - 4. Open channel flow meters.
 - 5. Electro-Magnetic flowmeters.
 - 6. Other flow meters offering field calibration capability.
 - 7. Analyzers, such as dissolved oxygen, pH, DO, ORP, TDS, and similar process analyzers.
 - 8. Valve position analog indicators.
 - 9. Transmitters for electrical values, such as voltage, current, and watt transducers.
 - 10. Temperature switches, pressure switches, and the like.
- C. Provide certificates of factory calibration for instruments for which the manufacturer provides no means of field calibration, such as the flow element of an electromagnetic flow meter.
- D. Some instruments contain small meters or gauges, which cannot be calibrated in the field, to indicate output signals. Record the performance of these indicators as if an external indicator.
- E. Verify that the instrument is working while isolated.
- F. Notify Owner and Engineer minimum six working days in advance of calibrating an instrument. The Owner or Engineer will witness the calibration and sign the calibration report, but only to denote presence as a witness.
- G. Calibration Procedure:
 - 1. Remove shipping stops/plugs from instruments before starting.
 - 2. Have instruction manuals available, and install miscellaneous components which have been supplied separately but are integral parts of equipment.
 - 3. Nameplate check: Verify data on nameplate with respect to conditions of range, operating temperature, specific gravity, and other ratings required by the Specifications and as submitted. Correct discrepancies before proceeding.
 - 4. For analyzers, use standard solutions or mix solutions strictly in accordance with manufacturer's instruction.

5. Calibrate each instrument in accordance with manufacturer's calibration procedures over full operational range. Prove instruments to be within published specification and accuracy. Then calibrate the entire loop, including wiring, remote indicators, loop isolators, and SPD. Prove each item in loop to be within published accuracy.
6. Where an instrument loop controls a plant variable, such as return activated sludge flow rate, calibrate the loop as a system (i.e., transmitter, controller, and VFD). Components which have adjustable features shall be carefully set for specific conditions and applications of this project.
7. Place a calibration sticker on each active component of the loop, showing
 - a. Calibration report number and date.
 - b. Equipment identification tag number.
 - c. Printed name of person who performed calibration.
8. Prepare and submit a calibration report for each loop, showing the below information. Provide serial number where shown on the equipment name plate, although it is recognized that not all items will bear a serial number.
 - a. Calibration report number and date.
 - b. Owner's name and project name.
 - c. Service of instrument, such as "RAS flow."
 - d. Equipment identification tag number.
 - e. Engineering name of variable of interest, such as "Level," even though it is being measured by a pressure transmitter.
 - f. List of equipment used to independently measure process variable.
 - g. For analyzers:
 - 1) Manufacturer's name and catalog number for standard solutions.
 - 2) Method of use of solutions.
 - h. For transmitters:
 - 1) Manufacturer's name, model number(s), and serial number(s) for transmitter and element.
 - 2) Range of capability of transmitter.
 - 3) Calibrated range for this project.
 - 4) Table showing actual value of measured variable versus mA output of transmitter. Show minimum of two such points. Some Sections may require more than two calibration points.
 - i. For signal isolators in the loop:
 - 1) Manufacturer's name, model number, and serial number.
 - 2) Table showing mA in versus mA out at 0%, 50%, and 100%.
 - j. For signal converters in the loop:
 - 1) Manufacturer's name, model number, and serial number.
 - 2) Table showing signal-in versus signal out at 0%, 50%, and 100%.
 - k. For indicators in the loop:
 - 1) Manufacturer's name, model number, and serial number.
 - 2) Table showing signal-in versus reading at 0%, 50%, and 100%.

- l. For switches:
 - 1) Manufacturer's name, model number, and serial number.
 - 2) Table showing value of process variable versus contact action.
- m. Date of calibration.
- n. Printed name of person who performed calibration. Signature.
- o. Printed name of person who witness calibration. Signature.

END OF SECTION

SECTION 40 60 20

INSTALLATION AND TESTING OF CONTROL CIRCUITS AND DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation and testing of control circuits.
- B. Installation and testing of control devices.

1.02 SYSTEM REQUIREMENTS

- A. Definition of a Control Device:
 - 1. A device which measures a process variable, such as a level switch, and produces a discrete signal. Certain switches which respond to analog process variables, such as pressure switches and temperature switches, are treated as if they are instruments under Section 40 60 10 – Installation, Testing, and Calibration of Instrumentation.
 - 2. Hand switches that are field mounted. Hand switches in control panels are covered under Section 40 78 10 – Control Hardware, and Sections referenced therein.
 - 3. Relays that are field mounted. Relays in control panels are covered under Section 40 78 10 – Control Hardware, and Sections referenced therein.
 - 4. Indicator lights, horns, alarm strobes, and similar discrete operator interface devices that are field mounted.
 - 5. Other devices which produce a discrete signal.
 - 6. Other similar devices that are neither instrumentation nor power devices.
- B. Controls refers to the entire system of control devices and to all circuits associated with the plant control system in the larger sense, except for those circuits covered under Section 40 60 10 – Installation, Testing, and Calibration of Instrumentation.
- C. Provide labor to accomplish a complete, tested, and correctly operating installation.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 INSTALLATION OF CIRCUITS

- A. Use type and size of wire or cable specified in Section 26 05 19 – Low Voltage Wire and Cables, or as shown on the Drawings, whichever is greater.

- B. Color code and label every wire end as specified in Section 26 05 19 – Low Voltage Wire and Cables.
- C. Run control circuits from control device to control device to control panel with no intermediate connection except:
 - 1. Where terminal boards are shown on the Drawings.
 - 2. Where terminal boards with appropriate enclosures are proposed by the Contractor and allowed in writing by the Engineer.
- D. Connect to remote terminal unit (RTU), remote control panel (RCP), programmable logic controller (PLC), or similar controller I/O terminals and power-up equipment only after testing specified below is complete.
- E. Maintain physical separation between DC instrumentation circuits and all AC circuits.
- F. The quantity, type, and AWG of wire and cable called for on the Drawings is for facility equipment as designed. If equipment is furnished which requires a greater quantity of, different type or larger AWG wire or cable than called for, then furnish the correct quantity, type and AWG plus appropriate conduit at no additional cost to the Owner. Submit proposed changes to the Engineer for review.

3.02 TESTING OF CIRCUITS

- A. Conduct testing to verify that control circuits and associated power circuits are properly installed and connected, that there are no shorts, and that there are no unintentional grounds on the conductors. Lift intentional grounds for and verify that there are no unintentional grounds on the neutral conductors.
- B. Connect circuits to the terminals of the controller and connect intentional grounds.
- C. Provide all test equipment.

3.03 INSTALLATION OF CONTROL DEVICES

- A. Coordinate installation of control devices such that devices are installed by appropriately skilled workers and such that all necessary labor and materials are included in the Bid. Also determine which trade will provide and install such adapters and hardware as needed for a complete, working installation. For another example, determine in advance which trades will install concrete that might be needed for support of stands for control devices.
- B. Follow recommendation and instructions of equipment manufacturer in addition to requirements of Drawings and Specifications in installation of control devices.

- C. Cleaning: Before assembly or installation, thoroughly clean equipment of temporary protective coatings and foreign materials. After installation of equipment, clean external surfaces of oil, grease, dirt, or other foreign material.
- D. Mount control devices approximately where shown on the Drawings. Propose exact locations to the Engineer in advance of mounting. Mount with pipe stands, brackets, or strut as specified and as shown on the Drawings. If not detailed on the Drawings, propose bracket details in the field. Provide floor stands where control devices are located way from walls or other building structure.
- E. Painting: Paint ferrous, custom, or field-fabricated brackets, stands, and miscellaneous mounting members as specified in Division 9 - Finishes. Painting is not required for aluminum, galvanized steel, or stainless steel.
- F. Mount control devices at a convenient height (approximately 54" centerline) above the finished walking surface (grade), where it is easily accessible to the plant operator and for maintenance.

3.04 TESTING OF CONTROL DEVICES

- A. First, test control devices individually.
- B. Then, test control devices as part of a system, such as operating a motor in HAND. Verify that every motor operates correctly in HAND and that control devices such as float and limit switches operate correctly as part of the system.
- C. Perform other testing of control devices as required by Section 40 60 00 – Process Control Commissioning.
- D. Notify Engineer minimum six working days in advance of testing control devices as part of a system. The Engineer will either witness the testing or notify the Contractor that witness testing is waived for all or part of the devices.

END OF SECTION

SECTION 40 73 13

PRESSURE GAUGES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install pressure gauges and gauge accessories as specified and as shown on the Drawings.

1.02 SUBMITTALS

- A. Section 01 33 23 – Shop Drawings, Product Data, and Samples:
 - 1. Product Data for Gauges and Accessories.

1.03 OPERATION AND MAINTENANCE DATA

- A. Section 01 78 23: Operation and Maintenance Data.
- B. Manufacturer's complete operations and maintenance manuals, including the following items as a minimum:
 - 1. Operating Instructions.
 - 2. Maintenance Instructions.
 - 3. Calibrating Instructions.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES FOR WATER AND AIR SERVICE

- A. Accuracy Requirements: $\pm 1.0\%$ of span, ASME B40.100 Grade 1A.
- B. Materials of Construction and Design Features:
 - 1. Bourdon Tube: Type 316 stainless steel.
 - 2. Case liquid filled at factory, glycerine.
 - 3. Case: Type 304 stainless steel.
 - 4. Dial Size: 4".
 - 5. Process Connection: Type 316L stainless steel, 1/4" NPT lower connection of gauge.
- C. Scale: As shown on Drawings.
- D. Manufacturer: WIKA Type 233.54; 1/4" male NPT process connection; factory filled and tack welded to overpressure protector-diaphragm seal assembly to form a single unit. See Drawings for gauge connection mounting and required installation.
- E. Overpressure Protector: WIKA Type 910.13.

1. Function: Spring-actuated piston closes valve at given high pressure setting to protect gauge.
 2. Connections: ½” NPT male inlet, ¼” NPT female outlet.
 3. Body and Piston Valve: Type 316 Ti SS (titanium stabilized).
 4. O-Ring: FPM (Viton).
 5. High Pressure Setting: Factory preset to match high pressure scale value on gauge.
- F. Gauge Diaphragm Seal: WIKA Model L990.10 diaphragm type chemical seal with ½” NPT female process connection.
1. Overpressure protector (instrument) connection size: ½” NPT female.
 2. Body and Diaphragm: 316L stainless steel.
 3. Gasket: Viton.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Per manufacturer’s instructions.

3.02 SCHEDULE

- A. As indicated on Drawings.
- B. Two (2) installed on each side of the booster station. Location to be determined by Owner.

END OF SECTION

SECTION 44 42 56.33

PACKAGE BOOSTER PUMPING SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish, install, and test all pumps, motors, manifolds, valves, gauges, electrical controls, hydropneumatic tank, and all related appurtenances to complete a booster pumping system for the Mesilla Booster Pump RPLC, as shown on the Drawings, and specified herein.

1.02 RELATED WORK

- A. Division 26 – Electrical

1.03 REFERENCES

- A. Hydraulic Institute (HI) Standards:
 - 1. ANSI/HI 9.6.4 – Rotodynamic Pumps for Vibration Measurements and Allowable Values.
 - 2. ANSI/HI 14.6 – Rotodynamic Pumps for Hydraulic Performance Acceptance Tests.
- B. National Sanitation Foundation International (NSF):
 - 1. NSF/ANSI 61 - Drinking Water System Components – Health Effects.
 - 2. NSF/ANSI 372 - Drinking Water System Components – Lead Content.
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 508A – Standard for Industrial Control Panels.

1.04 SUBMITTALS

- A. Product Data: Section 01 33 23 – Shop Drawings, Product Data, and Samples:
 - 1. Performance curves and test results for pump and motor.
 - 2. Materials of construction for all packaged equipment
 - 3. Dimensioned pump outline drawings.
 - 4. Dimensioned elevation and plan views of skid assembly and building.
 - 5. Detailed electrical data.
 - 6. Warranty
 - 7. Installation instructions
 - 8. Written description of control sequence.
 - 9. Manufacturer’s written certification of compliance with NSF 61 and NSF 372.

- B. Operation and Maintenance Manuals: Section 01 78 23 – Operation and Maintenance Data.
- C. Training for Owner’s Personnel Suitable for Video Recording: Section 01 79 01 – Manufacturer’s Instruction of Owner’s Personnel.
- D. Certification that Installation is Ready to Use: Part 3 herein.

1.05 ELECTRICAL AND CONTROL SYSTEM

- A. Instrumentation, control panel, and variable frequency drives (VFDs) to be furnished under this section and shipped loose for installation in the field as shown on the record drawings by the Contractor.
- B. Installation of conduits and conductors between instruments, control panel, VFDs, motors and appurtenances shall be provided and installed by the Contractor.
- C. System shall be tested and calibrated in the field as part of this section and shall be tested as a complete system.

1.06 QUALITY ASSURANCE

- A. The equipment specified herein shall be provided by a single, sole-source supplier whom shall be responsible for the adequacy of design and operational parameters of the equipment. Guarantees in lieu of a sole-source supplier shall not be accepted.
- B. The system manufacturer shall have a minimum of ten years manufacturing and application experience and shall be responsible for the proper pressure and flow in the system.
- C. The packaged pumping system manufacturer shall have in place an ISO 9001 compliant Quality Assurance Program to assure the quality of engineering design, components, materials, and workmanship provided in the packaged pumping system. Upon request, this procedure shall be submitted to the Engineer.

1.07 WARRANTY

- A. Five-year warranty, from date of Substantial Completion, for pump and motor burn-out.
- B. Two-year warranty, from date of Substantial Completion, for motor bearings.
- C. One-year warranty, from date of Substantial Completion, for the complete system.
- D. The manufacturer shall maintain, within 200 miles of the Project, an authorized warranty repair station that has been in operation for at least five years prior to the start of this Project.

1.08 GENERAL REQUIREMENTS

- A. All materials and products specified herein that come in contact with drinking water or raw water supply shall be NSF/ANSI 61 compliant, and shall be lead-free, as certified by the Water Quality Association to comply with NSF/ANSI 372.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Canariis Corporation
- B. Grundfos
- C. Or Engineer reviewed equivalent

2.02 PACKAGE BOOSTER PUMPING SYSTEM

A. Pumps:

1. Vertical multi-stage pump.
2. Flanged in-line suction and discharge.
3. Self-adjusting mechanical seal.
4. Suitable for continuous operation.
5. Materials:
 - a. All wetted materials in contact with potable water shall be NSF/ANSI 61 and NSF/ANSI 372 compliant.
 - b. Impeller: Stainless steel.
 - c. Shaft: Stainless steel.
 - d. Outer Sleeve: Stainless steel.
 - e. Diffuser: Stainless steel.
 - f. Mechanical Seal:
 - 1) For pressures less than 150 psi: Carbon-ceramic seal faces.
 - 2) For pressures of 150 psi or more: Carbon-tungsten seal face.
 - 3) Stainless steel metal parts.
 - g. Motor Supports: Cast iron.
 - h. Pump Base Housing: Cast iron.
 - i. Pump Head: Cast iron.
 - j. Coupling: Cast iron.
 - k. Grundfos Series CR or Engineer reviewed equivalent.

B. Motor:

1. 3600 rpm TEFC NEMA C Face.
2. Positive alignment of rotating element.
3. 208V, 60 Hz, 3-Phase unless otherwise scheduled.
4. Inverter Duty Rated
5. Supplied by pump manufacturer.
6. Non-overloading through entire operating range.
7. Positive alignment of rotating element.
8. Non-overloading through entire operating range at the site conditions.

C. Hydropneumatic Tank

1. Bladder-style with bolted blind flange on top of tank for bladder removal.
2. Design, Materials, Shop Fabrication, and Inspection shall be in conformance to Section VIII, Division 1, of the ASME Boiler and Pressure Vessel Code with only the plate steels in Table UCS-23 of said code being used. Provide ASME code stamp, National Board Registration Number, and pressure rating on tank.
3. Designed to withstand the hydrostatic operating pressure and test pressure scheduled herein with no reactive load permitted through the connected piping.
4. Bladder material shall be food-grade, heavy-duty butyl rubber sized to conform to the inner shape of the pressure vessel.
5. Factory Coatings:
 - a. Interior: Epoxy-lined system connections.
 - b. Exterior: SSPC-SP6 Commercial Blast Cleaning surface preparation with two-component epoxy finish, minimum 79% solids content at minimum 3 mils DFT.
6. Accessories:
 - a. Charging Valve: 0.302-32NC valve
 - b. Lifting rings on top and side
 - c. 1-inch NPT plug
 - d. 4-inch dial pressure gauge, stainless steel, glycerin filled, 0-200 psig, for monitoring tank pressure.
 7. Design Basis Model: Wessels FXA700.
 8. Non-Toxic: NSF 61 compliant.
 9. Lead-Free: NSF 372 compliant.

D. Electrical, Instrumentation and Controls

1. Control Panel
 - a. Shipped loose for installation in the existing building.
 - b. UL 508A labeled
 - c. NEMA 1 enclosure
 - d. Individual disconnects with external handles
 - e. Fuse blocks with fuses
 - f. Control power on-off switch and light
 - g. Programable logic controller (PLC) with interface display
 - h. Pump running lights
 - i. H-O-A selector switches
 - j. 115V fused control circuit transformer
 - k. Pump minimum run timer
 - l. Auto alternation
 - m. Pump operating and sequence controls
 - n. Pump runtime indication
 - o. Low suction pressure alarm and shutdown with auto reset and indication
 - p. Auxiliary relay alarm contacts
 - q. Auxiliary relay pump status contacts
 - r. 4-20mA outputs (suction and discharge pressure)
2. Pressure Transmitters
 - a. Process Connection: 1/4" NPT
 - b. Wetted Materials: One-piece stainless steel pressure port
 - c. Range: 0-100 psi

- d. Accuracy: $<\pm 1\%$ of FS span
 - e. Operating Temperature Limits: -20° to 85°C
 - f. Two-wire 4-20 mA dc
 - g. Supply voltage: loop powered
 - h. Zero Offset: $\pm 2\%$ of FS span
 - i. Measurement Specialties (www.meas-spec.com) Model MSP300-100-P-5-N-1 or Engineer reviewed equivalent.
3. VFDs
- a. Shipped loose for installation in the existing building.
 - b. Phase to phase and phase to ground transient protection on input. Comply with the requirements of EN 6100-4-4 Burst Transients and EN 6100-4-5 Surge Transients.
 - c. AC to DC converter with AC reactor or DC choke to limit inrush and reduce harmonics.
 - d. Provide drive output protection such that short circuit or ground fault on the motor leads does not damage the drive.
 - e. Motor Overload Protection: provide a separate solid-state overload relay or provide speed sensitive solid state motor overload protection integral to the drive electronics.
 - f. Control power transformers for drive itself, for bypass contactors, and for others loads as shown on the Drawings. Provide extra VA capacity as scheduled or shown on the Drawings.
 - g. Voltage: 208V 3 phase nominal, self-adjusting for 200-240V $\pm 10\%$ input.
 - h. Duty Rating: provide drives that are rated standard duty “variable torque” and which can provide at least 110% of scheduled minimum current capacity for at least 1 minute out of 5 minutes.
 - i. Drive and Motor Protection:
 - 1) Shutdown for:
 - a) Input overvoltage, undervoltage, or voltage unbalance,
 - b) Overheating,
 - c) Other internal drive faults,
 - d) Motor overload or fault.
 - j. Provide dry contacts for running and alarm.
 - k. ABB ACH550 Series or Engineer reviewed equivalent.

E. Equipment Mounting:

1. The pumping equipment shall be secured to the booster station floor by bolting to a subframe that is secured by welding to the booster station floor or subfloor.
2. The subframe shall be constructed of structural steel members of sufficient section to limit deflection to less than $L/360$ with all pump components, motors, and piping installed.
3. Steel supports shall be provided to fully support the process piping, manifolds, valves, hydropneumatic tank, controls, electrical equipment, and other accessories. Supports shall be welded to the booster equipment base.
4. All structural steel welds shall be performed by certified welders (AWS D1.1). Copies of welder certificates shall be provided upon request by the Owner or Engineer.

- F. Paint structural steel and iron components to conform to industry standards. Final color shall be a dark blue to represent potable water.

2.03 MAINTENANCE MATERIALS

- A. Spare Parts: One set of mechanical seals and any O-rings for each pump unless otherwise scheduled.

2.04 FACTORY TESTING

- A. Connect suction and discharge piping to source and sink of water.
- B. The booster system shall be hydrostatically tested at 50 psig over maximum system working pressure, or 150 psig, whichever is greater, for a period of no less than one hour.
- C. The booster system shall undergo a complete electric and hydraulic test over the design capacity range. Each pump shall be tested individually for shut-off pressure, total dynamic head, and motor load at 25%, 50%, 75%, and 100% of the pump design capacity.
- D. The testing facility shall include Flow Meters, Test Gauges, Watt Meter, Digital Multi-Meter, Tachometer and Differential Pressure Transmitters for measuring system performance which are traceable to the National Institute of Standards and Technology (NIST). All control devices, including transmitters and all safety features, shall be factory calibrated and tested.
- E. Each Control panel shall be designed, built and tested per UL508A prior to integrating with the pumping system. The testing includes verification of wiring, component operation, programming and sequence testing.
- F. The pumping system shall be connected to a test tank with the actual components, valves and sensors specific for this project. Any calibrations or adjustments that are required for proper system operation shall be performed. All sequencing controls, alarms and system operation shall be tested and verified to be functional prior to removal from the test tank. These tests may be witnessed by the Engineer, Owner, or a representative, if required.
- G. Test results shall be provided to Engineer for review and approval prior to shipment of the station. The manufacturer shall correct all defects and retest the repaired equipment prior to shipment.
- H. The manufacturer shall correct all defects and retest the repaired equipment prior to shipment.
- I. The manufacturer shall furnish a full testing report.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with manufacturer's recommendations.
- B. Accurately aligned with suction and discharge piping so no stress is transmitted to pump flanges.
- C. The manufacturer shall provide certification that installation, controls, and initial operation of all components specified herein are in accordance with the manufacturer's requirements.

3.02 FIELD TESTING

- A. Perform alignment of pumps and motors in accordance with manufacturer's instructions.
- B. Furnish the services of the Package Booster Pumping System supplier's Field Service Representative to verify and certify that the installation and alignment have been completed in accordance with the manufacturer's requirements.
- C. With the assistance of the Field Service Representative, demonstrate to Owner and Engineer that all pumps, valves, gages, and the low flow protection system operate properly and all elements of the sequence of operations have been programmed as specified. Include the following demonstrations:
 - 1. Rotate pump by hand to confirm free rotation.
 - 2. Confirm power source is delivering correct voltage.
 - 3. Measure and record static inlet pressure. Confirm pressure is adequate to operate pumps.
 - 4. Jog pumps to verify correct rotation.
 - 5. Start and stop all pumps in Hand and in Automatic, individually and together.
 - 6. Slowly fill piping system with water and evacuate all air from pump volutes, control valves, air valves, pressure transmitters, and high points.
 - 7. Test and adjust low suction alarm set point by briefly running pump with closed inlet valve.
 - 8. Test and adjust "call for water" pressure transmitter (operator configurable at control panel). Confirm minimum pump "on" delay timer is set properly.
 - 9. Test and adjust low system discharge pressure transmitter and alarm.
 - 10. Test and adjust high system discharge pressure transmitter, alarm and automatic pump shutdown.
 - 11. Test temperature probe and purge valve on pumps.
 - 12. Verify and record all set points. List field-adjusted set points in the final Operation and Maintenance Manual.
 - 13. Check piping system for leaks. Check that system holds pressure when pumps are off.
 - 14. Record normal operating flow; and suction and discharge pressures.
- D. Startup, checking, and testing of equipment: Two (2) hours minimum.

- E. Training of Owner's personnel: One (1) hour minimum on operation, maintenance, and safety per requirements of Section 01 79 01 – Manufacturer's Instruction of Owner's Personnel.

3.03 REQUIRED SUPPORT BY FIELD SERVICE REPRESENTATIVE

- A. See Section 01 75 01 – Field Service Representative for qualifications of Field Service Representative.
- B. Present to check installation and operation.
- C. Provide 2 hours of training to Owner's personnel on operation and maintenance per requirements of Section 01 78 23 – Operation and Maintenance Data.
- D. Furnish written report to Engineer certifying that equipment is properly installed, fully functional, ready for use, and is operating correctly.

3.04 SCHEDULE

- A. Booster Pumping System:
 - 1. Site Conditions:
 - a. Site Elevation: 4,025 ft. AMSL.
 - b. Ambient Temperature Range: 55°F to 95°F.
 - 2. Pump "1 & 2":
 - a. Design Basis Manufacturer: Grundfos.
 - b. Design Basis Model: CR 20-3 A-B-A-E-HQQE. Vertical, multistage centrifugal pump with suction and discharge ports on the same level.
 - c. Rotation: Right hand (clockwise when viewed from driver end).
 - d. Connection Sizes: 2-inch suction, 2-inch discharge, ANSI B16.1 Class 125 pattern flanges.
 - e. Design Duty Point 1: 127 gpm at 143 feet TDH at 3508 rpm (100%).
 - f. Impeller Diameter: 4.13 inches.
 - g. Pump Efficiency: 60 %.
 - h. Motor: 7.5 HP, 3515 rpm, 208-230 VAC, 3-phase, 60 Hz, TEFC enclosure, 1.15 service factor, inverter duty.
 - i. Quantity: Two (one duty, one standby).
 - 3. VFD: 10 HP
 - 4. Hydropneumatic Tank: 185 gallon
 - 5. Accessories: As indicated on the Drawings.

END OF SECTION

QUOTE FROM SUPPLIER OF PACKAGE BOOSTER SYSTEM

For information only



JAMES, COOKE & HOBSON, INC.

3800 Doniphan Drive, El Paso, TX 79922

Phone: 915-581-5458

Fax: 915-581-9242

E-mail: mas@jchinc.com

December 2, 2021

To: **Molzen Corbin**

Quotation #: **21-Canariis**

Attn: **John Montoya, P.E.**

Job Name: **Domestic Booster**

Location: **Mesilla, NM**

Quotation By: **Mark Snyder**

Unless otherwise stated: Prices are firm for 30 days from bid date, payment terms are NET 30 DAYS from shipment. Prices are based on no Retainage being held by Contractor. Interest shall accrue at .5% per month on past due amounts per month. Freight terms are F.O.B. Ground Freight is included. Any taxes are additional. **Items included are only those listed below.** Please review carefully.

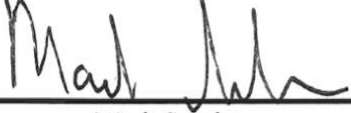
| <u>QTY</u> | <u>DESCRIPTION</u> | <u>EACH</u> | <u>TOTAL</u> |
|------------|------------------------------|-------------|-----------------|
| | PACKAGED BOOSTER SKID | | \$63,432 |

1 Canariis Packaged Booster Skid with the following:

- Canariis Model DM-254-61-2VS, 254 gpm Capacity, 61 psi boost, 46” by 54” by 67” Tall, 1,300 lbs
- Duplex Pumps, 2 Grundfos Model CR20-3, Vertical In-Line Multi-Stage, , Inverter-Duty Rated, 7.5 hp, 3600, 208/3/60, Duty of 127 gpm at 141’ tdh ea
- 304L SS Manifolds, 4”
- Suction and Discharge Isolation Valves, Pressure Gauges
- Discharge Check Valves, Thermal Purge Valves, PRVs, and ARVs
- Control Panel with UL Listing, Control Power Switch, PLC, Pump Run Lights, HOA, Pump Min Run Timers, Auto Alternation, Sequence Controls, Low Suction Alarm, Low System Alarm, High System Alarm with Programmable HMI, NEMA 1 Enclosure, SCADA Contacts for Pressure, Speed, Staus and Alarms
- Variable Frequency Drives, Model ABB ACH550 Series used for Speed Control, 208/3/60, NEMA 1 Enclosures
- Pressure Transmitter on Discharge Header
- Low Suction Pressure Switch
- Hydro-Pneumatic Tank, 185 Gallons, Remote Mounted, 150# Rated
- Submittals, Factory Test, Startup, O&M Manuals and Training

Notes:

- 1. Offloading and Crane by others.**
- 2. Delivery is 13-14 weeks.**
- 3. Test water by others.**
- 4. Foundation, Anchoring and Final grout by others.**
- 5. Other High/Low Voltage Panels, Disconnects, SCADA by others**



Mark Snyder

VARIABLE SPEED BOOSTER SYSTEM DATA SHEET

JOB NAME Mesilla Water System

DATE 12/1/21

LOCATION Mesilla, NM

QUOTE # P-0577-21

ENGINEER

CONTRACTOR

DISTRIBUTOR James, Cooke & Hobson, inc.

SYSTEM INFORMATION table with columns for SYSTEM MODEL NO., SYSTEM CAPACITY, SYSTEM PRESSURE, MINIMUM SUCTION PRESSURE, MAXIMUM SUCTION PRESSURE, SYSTEM DIFFERENTIAL PRESSURE.

SYSTEM POWER 208 VOLTS 3 PHASE 60 HERTZ

PUMP INFORMATION table with columns for PUMP NO., PUMP TYPE, PUMP SIZE, VARIABLE / CONSTANT SPEED, MOTOR HP / FLA, MOTOR ENCLOSURE, DESIGN RPM, DUTY POINT, TDH, PRV OR CHECK VALVE SIZE, PUMP SHUTOFF PSIG, MAX WORKING PRESS PSIG.

MAX. WORKING PRESSURE IS THE TOTAL OF THE MAXIMUM SUCTION PRESSURE PLUS PUMP SHUT OFF HEAD AT MAX. SPEED AND MUST NOT EXCEED THE ALLOWABLE WORKING PRESSURE OF THE COMPONENTS.

- STANDARD SYSTEM FEATURES: COMPLETELY PREFABRICATED, 304L STAINLESS STEEL MANIFOLDS, INDIVIDUAL PUMP ISOLATION VALVES, CHECK VALVE ON EACH PUMP, THERMAL PURGE VALVES, SYSTEM AND SUCTION PRESSURE GAUGES, FACTORY TEST.

- SYSTEM OPTIONS: PRV'S IN PLACE OF CHECK VALVES, PUMP PRESSURE GAUGES, FABRICATION FOR "FIELD KNOCKDOWN".

SYSTEM CONSTRUCTION: MANIFOLD SIZE 4" CONNECTIONS GROOVED/FLANGED, CONFIGURATION RIGHT HAND/LEFT HAND/CUSTOM, SYSTEM DIMENSIONS AND DRY WEIGHT L 46" x W 54" x H 67" WT 1,300 #

- HYDRO-PNEUMATIC TANK: MODEL FX300V 80 GALLONS 150#, MODEL FX500V 132 GALLONS 150#, MODEL FX750V 198 GALLONS 150#, MODEL FXA300 79 GALLONS 125# ASME, MODEL FXA400 106 GALLONS 125# ASME, MODEL FXA500 132 GALLONS 125# ASME, MODEL FXA600 158 GALLONS 125# ASME, MODEL FXA800 211 GALLONS 125# ASME, MODEL FXA700 185 GALLONS 200# ASME.

- TANK LOCATION: ADJACENT TO SYSTEM, ON PUMP SKID, REMOTE MOUNTED. FOR UL LISTING TANK ON PUMP SKID MUST BE ASME. TANK CONNECTED PER PAGE, TANK STORAGE CAPACITY GAL. *NOTE: ALSO PAGE 9.60.05 OF I.O.& M. MANUAL

PUMP OPERATING AND SEQUENCE CONTROLS

- INTERMITTENT LEAD PUMP OPERATION
- CONTINUOUS RUN LEAD PUMP
- SUCTION & DISCHARGE PRESSURE SENSORS
- FLOW SENSOR(REMOTE MOUNTED)
- _____

PUMP SEQUENCE

| | | | | | | |
|-------------------------------------|-------|----|-------|-----|-------|------------------|
| <input checked="" type="checkbox"/> | 0 | to | 127 | GPM | PUMP | <u>1 OR 2</u> |
| <input checked="" type="checkbox"/> | 128 | to | 254 | GPM | PUMPS | <u>1 & 2</u> |
| <input type="checkbox"/> | _____ | to | _____ | GPM | PUMPS | _____ |
| <input type="checkbox"/> | _____ | to | _____ | GPM | PUMPS | _____ |

VARIABLE FREQUENCY DRIVES

- MANUFACTURER / MODEL _____ ABB / ACH580 _____ QUANTITY 2
- NEMA 1 ENCLOSURE NEMA 12 ENCLOSURE NEMA 3R ENCLOSURE
 - FULL SPEED ELECTRICAL BYPASS (MANUAL)
 - _____
 - _____

STANDARD CONTROL PANEL FEATURES

- UL LISTED ENCLOSED INDUSTRIAL CONTROL PANEL
- NEMA 1 ENCLOSURE
- INDIVIDUAL DISCONNECTS WITH EXTERNAL HANDLES
- FUSE BLOCKS WITH FUSES
- CONTROL POWER (ON-OFF) SWITCH AND LIGHT
- PROGRAMMABLE LOGIC CONTROLLER (PLC) _____ W / DISPLAY _____
- PUMP RUNNING LIGHTS
- H/O/A SELECTOR SWITCHES
- 115 VOLT FUSED CONTROL CIRCUIT TRANSFORMER
- PUMP MINIMUM RUN TIMING
- AUTO ALTERNATE EQUAL PUMPS
- MOUNTED AND WIRED ON SKID
- PUMP OPERATING AND SEQUENCE CONTROLS
- PUMP RUNTIME INDICATION

CONTROL PANEL OPTIONS

- NEMA 12 ENCLOSURE NEMA 3R ENCLOSURE NEMA 4 ENCLOSURE
- LOW SUCTION PRESSURE ALARM AND SHUTDOWN WITH AUTO RESET AND INDICATION
- LOW SUCTION LEVEL ALARM AND SHUTDOWN WITH AUTO RESET AND INDICATION – (SIGNAL BY OTHERS)
- LOW SYSTEM PRESSURE ALARM WITH MANUAL RESET AND INDICATION
- HIGH SUCTION PRESSURE SHUTDOWN WITH AUTO RESET AND INDICATION
- HIGH SYSTEM PRESSURE ALARM AND SHUTDOWN WITH MANUAL RESET AND INDICATION
- AUDIBLE ALARM WITH SILENCE PUSH BUTTON
- 24 HOUR TIME CLOCK - ALTERNATE EQUAL PUMPS
- 7 DAY TIME CLOCK FOR CONTINUOUS SYSTEM OPERATION
- FLOW SWITCH TO LIMIT LEAD PUMP ON-OFF CYCLING
- REMOTE ALARM PANEL WITH SILENCE PUSH BUTTON AND LIGHT
- AUXILIARY RELAY ALARM CONTACTS
- AUXILIARY RELAY PUMP STATUS CONTACTS
- LOCKABLE ENCLOSURE
- LIGHTNING ARRESTER
- EMERGENCY POWER ALARM TO PREVENT LAG PUMP(S) OPERATION (SIGNAL BY OTHERS)
- EMERGENCY POWER ALARM TO PREVENT SYSTEM OPERATION (SIGNAL BY OTHERS)
- 4-20mA OUTPUTS (SUCTION PRESSURE, SYSTEM PRESSURE)
- INDIVIDUAL POWER CONNECTIONS AND WITH SEPARATE CONTROL POWER CONNECTION
- _____

NOTES & COMMENTS:

NOTE: ALSO PAGE 9.60.06 & 9.60.07 OF I.O.& M. MANUAL