

**PROJECT MANUAL FOR
Sandoval County Placitas
Fire Station 41
Water System Improvements**

Sandoval County

**Procurement No. FY24-SCPW-04
NIGP Code: 91360, 91430, 91479**

April 2024

**Bid Open Date: May 15, 2024
Bid Time: 3:00 PM**

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Refer to the Index to Drawings included in the plan set entitled Sandoval County Fire 41 Placitas and dated April 2024.

ENGINEER CERTIFICATION

These Contract Documents and Construction Specifications for the **Sandoval County Fire Station 41 Water System Improvements Project** were prepared by:

Souder, Miller & Associates
5454 Venice Avenue NE, Suite D
Albuquerque, NM 87113
(505) 299-0942 or Fax (505) 293-3430

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



Keaton P. Chancellor
New Mexico PE License No. 24899

3-19-2024

Date

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

Engineer Certification (Electrical and Controls):

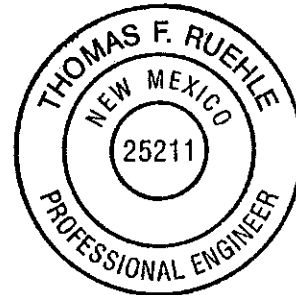
The following Drawings and Specifications were prepared by The Response Group, Inc. under the supervision of Thomas F. Ruehle, P.E. whose seal as a Professional Engineer licensed to practice in the state of New Mexico is affixed below.

DRAWINGS

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A handwritten signature in black ink that reads "Thomas F. Ruehle".

Thomas F. Ruehle, P.E.
New Mexico PE License No. 25211

3/18/24
Date

Engineer Certification (Tank Foundation and Retaining Wall):

The following Drawings and Specifications were prepared by Stubbs Engineering, Inc. under the supervision of Michael A. Stubbs, P.E. whose seal as a Professional Engineer licensed to practice in the state of New Mexico is affixed below.

DRAWINGS

- S-1 STRUCTURAL NOTES
- S-1.1 STRUCTURAL DETAILS
- S-2 FOUNDATION PLAN
- E-3 FOUNDATION DETAILS



Michael A. Stubbs, P.E.
New Mexico PE License No. 16814

Date

Engineer Certification (Building and Building Foundation):

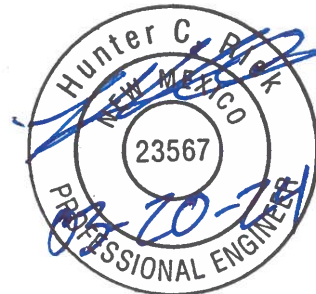
The following Drawings and Specifications were prepared by Souder, Miller & Associates under the supervision of Hunter C. Riek, P.E. whose seal as a Professional Engineer licensed to practice in the state of New Mexico is affixed below.

DRAWINGS

G-100	GEN NOTES, ABBREVIATIONS, AND TYPICAL DETAILS
S-100	FOUNDATION SECTIONS
S-101	BUILDING SECTIONS
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TECHNICAL SPECIFICATIONS

03 05 00	BASIC CONCRETE MATERIALS AND METHODS
03 10 00	CONCRETE FORMS AND ACCESSORIES
03 20 00	CONCRETE REINFORCEMENT
03 29 00	JOINTS IN CONCRETE
03 30 00	CAST-IN-PLACE CONCRETE
03 60 00	GROUT
05 12 00	STRUCTURAL STEEL
06 10 00	ROUGH CARPENTRY
07 41 13	METAL ROOF PANELS
08 11 13	STEEL DOORS AND FRAMES
08 71 00	DOOR HARDWARE
09 21 16	GYPSUM BOARD ASSEMBLIES
13 34 19	PRE-ENGINEERED BUILDINGS



03-20-24

Hunter C. Riek, P.E.
New Mexico PE License No. 23567

Date

ADVERTISEMENT FOR BIDS

Sandoval County

Owner

2708 Iris NE Rio Rancho, NM 87144

Address

Separate sealed BIDS for the construction of the Sandoval County Fire 41 Placitas Tank will be received at the office Souder, Miller & Associates by Keaton P. Chancellor at 5454 Venice Ave. NE, Suite D, Albuquerque, NM 87113 until 3:00 p.m. (Local Time), May 15, 2024, and then at said office publicly opened and read aloud.

Project Description:

Base Bid: This project consists of the construction of a new well building to be able to relocate the chlorination equipment and hydro-pneumatic pressure tank out from the current location within the fire house and the installation of a new plumbing manifold equipped with a new master meter, and reduced pressure zone backflow prevention device.

Additive Bid Alternates: This project also includes Additive Bid Alternate 1 to include the construction of a new foundation and relocation of three existing water storage tanks for fire storage facilities. Additive Bid Alternate 2, includes the installation of approximately 840 linear feet of 6-inch fire line to a new fire hydrant located at the fire station and at the Placitas Community Library. Perform Work of Contract under a stipulated price basis with Owner in accordance with Conditions of Contract.

The Bidding Documents may be examined at the following locations:

<u>Construction Reporter, 4901 McLeod Rd. NE Suite 200A, Albuquerque, NM 87109</u>	<u>(505) 243-9793</u>
<u>Dodge Data & Analytics at: www.construction.com</u>	<u>(800) 393-6343</u>
<u>Souder, Miller & Associates, 5454 Venice Ave. NE, Suite D, Albuquerque, NM 87113</u>	<u>(505) 299-0942</u>

Copies of the Bidding Documents in electronic media format may be obtained at the website of the ENGINEER, Souder, Miller & Associates, at www.soudermiller.com, at no cost. Bidders are responsible for monitoring the website referenced above for notifications of changes and addenda related to this project.

Resident Contractor and Resident Veteran Contractor Preferences shall apply to this Project per Section 13-1-21 NMSA 1978 (as amended).

A MANDATORY PRE-BID MEETING will be held at Sandoval County Placitas Fire Station 41 (463 NM-165, Placitas, NM 87043) on April 25, 2024 at 10:00 am.

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. 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.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office via the Engineer’s website (www.soudermiller.com) in the number and format stated in the advertisement or invitation to bid.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Bidding Documents in electronic media format are furnished to bidding contractors for the sole purpose of preparing bids, and not for construction. The selected construction Contractor shall not rely on files provided in electronic media format for construction, but rather hard copies of such data provided by the Engineer or Owner upon award of the Contract.

2.04 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 Prior to bidding on the Project, Bidder must carry all licenses required under New Mexico state law to complete the Work, and be duly registered with the New Mexico Department of Workforce Solutions with an “Active” status. Refer to Title 14 Housing and Construction of the New Mexico Administrative Code (NMAC), Chapter 6, Part 6, for a listing of classifications of licenses and certificates issued by the Construction Industries Division (CID) of the New Mexico Regulation and Licensing Department required by law to perform the Work. All Subcontractors must carry all licenses required under New Mexico state law to complete the work which they are to perform. Bidder and all Subcontractors must be properly licensed according to the requirements of the Construction Industries Licensing Act, Chapter 60, Article 12 NMSA 1978 and ensure that such licenses shall remain in effect for the duration of the Work and warranty periods. All tiers of Subcontractors whose portion of the Work is valued at greater than \$60,000 must also be duly registered with the New Mexico Department of Workforce Solutions prior to submittal of Bid, per Article 22 below. All electrical work, whether performed by Bidder or Bidder’s Subcontractor, shall be performed by a licensed electrician.

A. To demonstrate Bidder’s qualifications to perform the Work, the Bidder shall complete and submit the Bidder’s Qualifications Statement included in the Project Manual along with all supporting data together with the Bid, which will be used in the evaluation of the Bid prior to Award, as stipulated in Article 19 of these Instructions to Bidders. The Bidder may be considered non-responsive if the Bidder’s Qualifications Statement is not submitted in a timely manner.

3.02 A Bidder’s failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *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.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
- b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- 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 Report: The Bidding Documents contain a geotechnical report. The geotechnical report describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations.

The conditions described in the geotechnical report are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on these results and descriptions of conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the geotechnical report, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are covered in the geotechnical report.

Nothing in the geotechnical report 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.

- B. **Underground Facilities:** Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others. Bidder shall, per the provisions in the following paragraph, undertake additional subsurface investigation work to develop a sound understanding of subsurface conditions prior to preparing the Bid.
- C. **Adequacy of Data:** Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder 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.
- D. Bidder shall 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.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

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

4.05 *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 5 – BIDDER’S REPRESENTATIONS

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider 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 Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs;
- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A Mandatory Pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective. Any Bid presented by a Bidder who did not attend the Mandatory Pre-Bid Conference will not be considered.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent (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 (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 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 Documents, 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 Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 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 seven 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 seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, 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 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an “or-equal” or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.
- 11.02 All prices that Bidder sets forth in its Bid shall 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 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 If a List of Proposed Subcontractors is identified as a required attachment to the Bid Proposal, the Bidder is required to identify all Subcontractors whose subcontracted work surpasses the Subcontractor listing threshold of five thousand dollars (\$5,000). Firms identified in the List of Proposed Subcontractors shall not be substituted except as permitted under 13-4-36 NMSA 1978 of the Subcontractors’ Fair Practices Act.
- 12.02 If the Bidder fails to specify a Subcontractor in excess of the listing threshold, the Bidder represents that the Bidder, as the prime Contractor, is fully qualified to perform that portion of the Work. For each such listed Subcontractor, the Bidder shall include the following information:
- A. the name of Subcontractor that will perform work or labor or render service on the project identified in the Contract Documents and the city or county of its principal place of business; and
 - B. the category of the work that will be done by each Subcontractor; only one Subcontractor may be listed for each category of work as defined by the Bidder.

- 12.03 Contractor shall not substitute any person as Subcontractor in place of those identified on the List or Proposed Subcontractors without prior approval from Owner. (§ 13-4-36 NMSA 1978) The same applies to equipment manufacturers identified on the Equipment Suppliers List, when such a list is included in the Project Manual.
- 12.04 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.05 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.06 If requested by Owner, the apparent Successful Bidder shall provide to Owner an experience statement with pertinent information regarding similar projects and other evidence of qualification for each proposed Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, without an increase in Bid price.
- 12.07 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, Suppliers, or other individuals or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity 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 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 13.02 A Bid by a corporation shall 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 shall be shown.
- 13.03 A Bid by a limited liability company shall 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 shall be shown.
- 13.04 A Bid by an individual shall show the Bidder’s name and official address.

- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 *Unit Price*

- A. Bidders shall 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.

14.02 *Allowances*

- A. For cash allowances, when not already identified on the Bid Form, the Bid price shall 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 15 – SUBMITTAL OF BID

- 15.01 Bidder shall submit the completed Bid Form together with the Bid security and other documents required to be submitted together with Bid under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "**BID ENCLOSED for the SANDOVAL COUNTY FIRE 41 PLACITAS TANK.**" A mailed Bid shall be addressed to Souder, Miller & Associates, Attn: Keaton Chancellor at 5454 Venice Ave. NE, Suite D, Albuquerque, NM 87113.

- 15.03 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 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 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 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 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 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. 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, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor irregularities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project. The Additive and/or Deductive Bid Items, as well as

Alternate Bid Items are not listed in order of priority on the Bid Form. Award will be made to the lowest responsible and responsive Bidder that offers the lowest aggregate amount for the Base Bid, plus or minus those Additive or Deductive Bid Items, respectively, and Alternate Bid Items (if applicable) that fit within the funds determined available, and are in the Owner's best interests. However, in the case of additive bid items, if adding another item from the bid schedule list of priorities would make the award exceed the available funds for all Bidders, the Owner reserves the right to pick additive and/or deductive bid alternates that fit within the available funding. Ultimately, all Bids will be evaluated on the basis of the same Base Bid plus Additive or Deductive, and Alternate Bid Items.

- C. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 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.
- 19.06 A Bid submitted by a resident contractor that has a valid resident business certificate issued by the taxation and revenue department pursuant to Section 13-1-22 NMSA 1978 (as amended) but does not include a resident veteran business, shall be deemed eight percent (8%) lower than the Bid actually submitted, pursuant to Section 13-1-21 NMSA 1978 (as amended). When a joint bid or joint proposal is submitted by both resident and nonresident contractors, the resident contractor preference provided shall be reduced in proportion to the percentage of the contract, based on the dollar amount of the goods or services provided under the contract, that will be performed by a nonresident contractor as specified in the joint bid or joint proposal.
- 19.07 A Bid submitted by a resident veteran contractor that has a valid resident veteran business certificate issued by the taxation and revenue department pursuant to Section 13-1-22 NMSA 1978 (as amended), and with annual gross revenues of up to three million dollars (\$3,000,000) in the preceding tax year, shall be deemed ten percent (10%) lower than the Bid actually submitted, pursuant to Section 13-4-2 NMSA 1978 (as amended). When a joint bid or joint proposal is submitted by a combination of resident veteran, resident or nonresident contractors, the preference provided pursuant to Section 13-1-22 NMSA 1978 shall be calculated in proportion to the percentage of the contract, based on the dollar amount of the goods or services provided under the contract, that will be performed by each contractor as specified in the joint bid or joint proposal.
- 19.08 The resident contractor preference and resident veteran contractor preference shall not be awarded together. If the resident veteran contractor preference applies, it shall be in place of the 8% resident contractor preference.
- 19.09 If the Contract is to be awarded, Owner will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, after the 8% resident contractor preference or 10% resident veteran contractor preference is considered.

19.10 In order for a Bidder to be eligible for the Resident Contractor Preference (pursuant to 13-4-2 NMSA 1978) or Resident Veteran Preference (pursuant to 13-1-21 NMSA 1978) the Bidder shall submit with the Bid a copy of a valid Resident Contractor Certificate, or a valid Resident Veteran Contractor Certificate.

19.11 Protests:

- A. Any Bidder, Offeror, or Contractor who is aggrieved in connection with this procurement (Bid) may protest to the Owner in accordance with the Owners' requirements. The protest should be made in writing within twenty-four (24) hours after knowledge of the facts or occurrences giving rise thereto, but in no case more than fifteen (15) calendar days after knowledge of the facts or occurrences giving rise to the protest. (§ 13-1-172 NMSA 1978)
- B. The complete procedures and requirements regarding protest are available from the Owner upon request. (§ 13-1-172 to § 13-1-176 NMSA 1978)

ARTICLE 20 – BONDS AND INSURANCE

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

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall 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 shall 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 ten days thereafter, Owner shall 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 – SALES AND USE TAXES

22.01 New Mexico Gross Receipts Tax shall not be included in the Bid, except where specifically requested on the Bid form.

ARTICLE 23 – RETAINAGE AND PAYMENT

23.01 No retainage will be held on the project.

23.02 For the present project, a total of forty-five (45) days is required by the Owner to process any payment related to the Work, as detailed in the Supplementary Conditions.

ARTICLE 24 – NM DEPARTMENT OF WORKFORCE SOLUTIONS REGISTRATION

24.01 A Bidder that submits a Bid valued at more than sixty thousand dollars (\$60,000) must be registered with the Labor Relations Division, New Mexico Department of Workforce Solutions (NMDWS), Public Works Bureau, with an "Active" status, prior to submittal of Bid. The Bidder must enter his NMDWS registration number on the Bid Form and include a copy of the registration with the NMDWS as per Article 15 herein. The Bid presented by a Bidder who does

not meet this requirement shall not be considered for award, pursuant to NMSA 1978, Section 13-4-13.1.

- 24.02 All tiers of Subcontractors shall be subject to this same requirement. The Bidder must also enter the Labor Relations Division, New Mexico Department of Workforce Solutions (NMDWS), Public Works Bureau registration number on the List of Proposed Subcontractors for each Subcontractor when the value of the subcontracted work will exceed sixty thousand dollars \$60,000, as stated above. Any Subcontractor who lacks current registration, with an "Active" status, with NMDWS as of the date of Bid will be rejected, and the General Contractor will be required to substitute another registered Subcontractor acceptable to the Owner without any increase in Bid price.

ARTICLE 25 – SUBCONTRACTORS FAIR PRACTICES ACT

- 25.01 The Subcontractors Fair Practices Act (SCFPA) requires that Payment and Performance Bonds be prepared and presented by the prime Contractor and first-tier Subcontractors only. The Subcontractor's bonds are to be payable to the prime Contractor, not the Owner.
- 25.02 The Performance and Payment bond provided by an affected Subcontractor should follow current law in the SCFPA (§ 13-4-37 NMSA 1978) that is:
- A. Be issued by a corporate surety authorized to do business in New Mexico in accordance with the New Mexico Insurance Code;
 - B. Be a surety listed in the US Treasury Circular 570;
 - C. Name the prime Contractor as the obligee.
- 25.03 Pursuant to NMSA 1978, Section 13-1-148.1, a Subcontractor shall provide Performance and Payment Bonds if the Subcontractor's contract (to the Contractor) for work to be performed is one hundred twenty-five thousand dollars (\$125,000), or more. Failure of a Subcontractor to provide the required bonds shall not subject Owner to any increase in cost due to approved substitution of Subcontractor.
- 25.04 The Performance and Payment Bond required shall be provided to the general Contractor at the time the subcontract is executed. The Performance and Payment Bond is at the expense of the Subcontractor and should clearly state the amount and requirements of the bond. (§ 13-4-37 NMSA 1978)

ARTICLE 26 – NEW MEXICO STATE PROCUREMENT CODE

- 26.01 The Contractor is advised that the New Mexico State Procurement Code, Sections 13-1-28 through 13-1-199, NMSA 1978 imposes civil and criminal penalties for its violation. In addition, the New Mexico criminal statutes impose felony penalties for illegal bribes, gratuities, and kickbacks.

BID FORM

**Sandoval County Placitas Fire Station 41
Water System Improvements**

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Souder, Miller & Associates
Attn: Keaton Chancellor, PE
5454 Venice Ave. NE, Suite D
Albuquerque, NM 87113

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

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

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

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum Date</u>	<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. 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 any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. 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.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the

Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 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;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

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

Note: Gross receipts tax not included.

BASE BID: Well House and plumbing manifold and connection to the existing facilities					
Item	Description	Unit	Qty	Unit Price	Amount
1	Mobilization (75%)/Demobilization (25%), not to exceed 5% of the Base Bid	LS	1		
2	Material Testing Allowance	Allow	1	\$ 7,500.00	\$ 7,500.00
3	Electrical Extension Allowance	Allow	1	\$ 10,000.00	\$ 10,000.00
4	Preparation and implementation of a Storm Water Prevention Plan (SWPPP), CIP	LS	1		
5	Traffic control plan	LS	1		
6	Construction staking, including pipe alignments, appurtenances, and surveyed as-builts, CIP	LS	1		

7	Relocate existing 10,000 gallon welded steel tank for construction of the new well building at a location specified by the Owner.	EA	1		
8	Connection to existing 2-inch well line, including all fittings and appurtenances, CIP	EA	2		
9	Relocate existing chlorination system. Furnish and install chlorination piping and appurtenances as needed to connect to new plumbing manifold.	EA	1		
10	Saw cut remove and replace existing 2-inch asphalt concrete, CIP	SY	60		
11	Building site preparation including clearing, grading, import engineered fill, compaction and leveling, CIP	LS	1		
12	Well building foundation, including all labor, materials, excavation, backfill, reinforcement, and concrete, CIP	SF	150		
13	Pre-engineered manufactured building as shown on plans, including chlorination room, access doors, detailed in Technical Specifications, CIP	LS	1		
14	Concrete building apron including reinforcement, forms, all labor and equipment.	SF	55		
15	4-inch base course, including all material, labor, compaction, CIP	SF	149		
16	Pump house plumbing, including all fittings, piping, air valve, silent check valves, gate valves, flow meter, reduced pressure backflow preventor, and all appurtenances, CIP	LS	1		
17	Relocate existing hydro pneumatic pressure tank, including capping the existing copper line and reconnect to new plumbing manifold including all piping and appurtenances.	LS	1		
18	Furnish and install fire hydrant assembly, including tee, piping, gate valve, joint restraints, and all appurtenances, CIP	EA	1		
19	Furnish and install 6-inch PVC C900 pipe including all trenching, required fittings, restraints, bedding, backfill, tracer wire, warning tape, compaction, disinfection, testing, and all related appurtenances not included on Bid Form, CIP	LF	60		
20	Furnish and install 2-inch Schedule 40 steel pipe including all trenching, required fittings, restraints, bedding, backfill, tracer wire, warning tape, compaction, disinfection, testing, and all related appurtenances not included on Bid Form, CIP	LF	60		

21	Electrical and controls, including pump control panels, combination disconnects, pressure switch, surge protection devices, fusible disconnect, trenching and backfill, equipment racks, heater relocations, exhaust fan, grounding, and conduit and wiring as shown on plans, CIP	LS	1		
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TOTAL OF BID: \$ _____

IN WORDS: _____

ADDITIVE BID ALTERNATE 1: Includes the construction of a new concrete foundation and retaining wall for three (3) existing water storage tank, including the piping to the water storage tanks

Item	Description	Unit	Qty	Unit Price	Amount
A.1.1	Mobilization (75%)/Demobilization (25%), not to exceed 5% of the Additive Bid Alternate 1	LS	1		
A.1.2	Testing allowance	Allow	1	\$ 14,000.00	\$ 14,000.00
A.1.3	Construction staking, including pipe alignments, appurtenances, and surveyed as-builts, CIP	LS	1		
A.1.4	Relocate and re-install existing 10,000 gallon welded steel tank including establishing connection to new piping	EA	1		
A.1.5	Relocate and re-install existing 15,000 gallon fiber glass tank including establishing connection to new piping	EA	2		
A.1.6	Tank Foundation Site Preparation including clearing, grading, import engineered fill, compaction and leveling, CIP	LS	1		
A.1.7	Concrete foundation for existing tanks including all reinforcements, excavation, backfill, forms, and all labor and equipment, CIP	LS	1		
A.1.8	Saw cut remove and replace existing 2-inch asphalt, CIP	SY	40		
A.1.9	Furnish and install 6-inch PVC C900 fire waterline pipe including all trenching, required fittings, restraints, bedding, backfill, tracer wire, warning tape, compaction, disinfection, testing, and all related appurtenances not included on Bid Form, CIP	LF	50		
A.1.10	Furnish and install 2-inch stainless steel pipe, including all trenching, required fittings, restraints, bedding, backfill, tracer wire, warning tape, compaction, disinfection, testing, and all related appurtenances not included on Bid Form, CIP	LF	45		

A.1.11	Furnish and install 2-inch diameter gate valves including valve box, including concrete collar, fittings, trenching, backfill, materials, and labor, CIP	EA	3		
A.1.12	Furnish and install CMU retaining wall including all reinforcements, excavation, backfill, forms, and all labor and equipment, CIP	LF	68		

TOTAL OF ADDITIVE BID ALTERNATE 1: \$ _____

IN WORDS: _____

ADDITIVE BID ALTERNATE 2: Includes the installation of approximately 873 linear feet (LF) of new 6" fire waterline from the Station 0+00 to Approximately Sta. 8+40, including the installation of a new fire hydrant at the Placitas Library and all valves and appurtenances

Item	Description	Unit	Qty	Unit Price	Amount
A.2.1	Mobilization (75%)/Demobilization (25%), not to exceed 5% of the Additive Bid Alternate 2	LS	1		
A.2.2	Testing allowance	Allow	1	\$ 6,400.00	\$ 6,400.00
A.2.3	Construction staking, including pipe alignments, appurtenances, and surveyed as-builts, CIP	LS	1		
A.2.4	Furnish and install 6-inch PVC C900 fire waterline pipe including all trenching, required fittings, restraints, bedding, backfill, tracer wire, warning tape, compaction, disinfection, testing, and all related appurtenances not included on Bid Form, CIP	LF	840		
A.2.5	Furnish and install fire hydrant assembly, including tee, piping, gate valve, joint restraints, and all appurtenances, CIP	EA	1		
A.2.6	Furnish and install 6-inch diameter gate valves including valve box, including concrete collar, fittings, trenching, backfill, materials, and labor, CIP	EA	3		
A.2.7	Furnish and Install 1-inch combination air release valve, including all appurtenances, fittings, piping, saddles, vault, and braces, CIP	EA	1		

TOTAL OF ADDITIVE BID ALTERNATE 2: \$ _____

IN WORDS: _____

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 Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 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.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Required Bidder Qualification Statement with supporting data;
 - E. Evidence of authority to do business in the state of the Project;
 - F. New Mexico Contractor's License No.: _____;
 - G. Copy of Registration with the Labor Relations Division, New Mexico Department of Workforce Solutions, Public Works Bureau;
 - H. Copy of a valid resident business certificate or valid resident contractor certificate issued by the taxation and revenue department of the State of New Mexico (if applicable);
 - I. Copy of a valid resident veteran business certificate or valid resident veteran contractor certificate issued by the taxation and revenue department of the State of New Mexico (if applicable);
 - J. Campaign Contribution Disclosure Form

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

New Mexico Department of Workforce Solutions Registration No. _____

Is Bidder eligible for Resident Contractor Preference or Resident Veteran Contractor Preference as defined in the Instructions to Bidders?

Yes _____ Circle one: Resident Contractor Resident Veteran Contractor
No _____ Preference Preference

If yes, attach documentation of Resident Contractor or Resident Veteran Contractor eligibility.

BID BOND

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

BIDDER (*Name and Address*):

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

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name— Include Location*):

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

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

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

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

LIST OF PROPOSED SUBCONTRACTORS

The following listing must be completed and signed by the Bidder and submitted with the Bid Proposal. Bids submitted without this completed and signed listing or with more than one listed for each item may be considered non-responsive. The subcontractor listing threshold shall be as indicated in the Instructions to Bidders. If none of the work will be subcontracted, Bidder shall write "NONE", sign the sheet, and include with Bid to avoid being found non-responsive.

The General Contractor will determine categories of work that will be performed by the General Contractor, Subcontractors, and Tiers of Subcontractors. The following will be employed to perform the designated categories of work under this Contract.

Prior to award of the contract to the lowest qualified Bidder, the Contractor may be required to supply additional information regarding the Subcontractors listed below, as called for in the Instructions to Bidders, Bidder's Qualifications Statement, and in the technical specifications.

Contractor shall not substitute any person as Subcontractor in place of those identified on this form without prior approval from Owner. (§ 13-4-36)

Important Note Related to Public Works Projects: Contractor and all tiers of Subcontractors must be in compliance with the New Mexico Public Works Minimum Wage Act. Any Subcontractor whose work is valued at greater than \$60,000 must be registered with the Labor Relations Division, New Mexico Department of Workforce Solutions, Public Works Bureau at the time of Bid [13-4-13.1 NMSA 1978], and their registration number included below. If such registration is not in place and current as of the date of Bid, the Subcontractor will be rejected and the General Contractor will be required to substitute another Subcontractor acceptable to the Owner without any increase in Bid price.

* Category of Work	Firm Name and Business Address, Phone # and License Number of Subcontractors	** Range	NM Department of Workforce Solutions Registration No. (if applicable)

List of Proposed Subcontractors - Continued

* Category of Work	Firm Name and Business Address, Phone # and License Number of Subcontractors	** Range	NM Department of Workforce Solutions Registration No. (if applicable)

Use additional sheets if necessary.

Attest: _____

Authorized Officer

Date

Name and Title

Name of Firm

* Place title of subcontractor specialty.

** Subcontractor's contract range: In the column marked "Range", enter the letter corresponding to the subcontract amount.

A = Equal to or greater than \$5,000 but less than \$15,000

B = Equal to or greater than \$15,000 but less than \$50,000

C = Equal to or greater than \$50,000

BIDDER'S QUALIFICATIONS STATEMENT

Important Note:

Completion of this statement is required of all Bidders and must be submitted together with the Bid, as stipulated in the Instructions to Bidders.

PROJECT TITLE: Sandoval County Placitas Fire Station 41 Water System Improvements

SUBMITTED BY: _____
(Print or Type Name of Bidder)

ADDRESS: _____

The undersigned certifies the truth and correctness of all statements and of all answers to questions made hereinafter. Use additional sheets for any responses, as necessary.

1. How many years has your organization been in business as a utilities contractor? _____

2. How many years has your organization been in business under its present name? _____

3. If a corporation, answer the following:

a. Date of Incorporation: _____

b. State of Incorporation: _____

c. President's Name: _____

d. Vice President's Name: _____

c. Secretary or Clerk's Name: _____

d. Treasurer's Name: _____

4. If individual or partnership, answer the following:

a. Date of Organization: _____

b. Name and Address of all Partners:
(State if general or limited partnership)

5. If other than corporation or partnership, describe organization and name principals. _____

6. Do you plan to subcontract any part of this Project? _____ If so, briefly describe below and identify subcontractors on the List of Proposed Subcontractors form included in these Contract Documents, that meet the listing threshold. _____

7. Has any construction contract to which you have been a party, or any subcontractor identified on the List of Proposed Subcontractors form has been a party, been terminated for convenience or for cause; have you ever been debarred from contracting with any entity, public or private; have you ever terminated work on a project prior to its completion for any reason; have you ever filed a claim for disputed work; has any owner or prime contractor to which you've provided a performance bond ever put your surety on notice of their intent to terminate; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with the contract for which they furnished a bond on your behalf; has any subcontractor or supplier ever placed a claim against your payment bond; have you been late in completing a project during the last five years resulting in the assessment of liquidated damages? If the answer to any portion of this question is "yes", please furnish details of all such occurrences including name of subcontractor (if applicable), owner, architect or engineer, and surety, and name and date of project. _____

12. List the states and categories of construction in which your organization is legally qualified to do business. Include all license classifications your organization possesses in the State of New Mexico, as stipulated in the New Mexico Administrative Code (NMAC), Title 14, Chapter 6, Part 6. _____

13. List name, address, and telephone number of an individual who represents each of the following and who may be contacted for a financial reference.

a. A surety: _____

b. A bank: _____

c. A major material supplier: _____

14. The Owner may require the low Bidder to submit a financial statement, prepared on an accrual basis in a form that clearly indicates Bidder's assets, liabilities and net worth, plus additional information concerning past job performance such as list of last ten jobs you purchased a bond for along with name of surety on each, prior to issuance of the Notice of Award.

Dated this _____ day of _____ 20_____

Bidder: _____
(Print or Type Name of Bidder)

By: _____

Title: _____

(Seal, if Corporation)

CAMPAIGN CONTRIBUTION DISCLOSURE FORM

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

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

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

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

The following definitions apply:

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

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

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

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

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

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

Name(s) of Applicable Public Official(s) if any: _____
(Completed by State Agency or Local Public Body)

DISCLOSURE OF CONTRIBUTIONS BY PROSPECTIVE CONTRACTOR:

Contribution Made By: _____

Relation to Prospective Contractor: _____

Date Contribution(s) Made: _____

Amount(s) of Contribution(s) _____

Nature of Contribution(s) _____

Purpose of Contribution(s) _____

(Attach extra pages if necessary)

Signature Date

Title (position)

--OR--

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

Signature Date

Title (Position)

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

THIS AGREEMENT is by and between _____ Sandoval County _____ (“Owner”) and

_____ (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

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

Base Bid: This project consists of the construction of a new well building to be able to relocate the chlorination equipment and hydro-pneumatic pressure tank out from the current location within the fire house and the installation of a new plumbing manifold equipped with a new master meter, and reduced pressure zone backflow prevention device.

Additive Bid Alternates: This project also includes Additive Bid Alternate 1 to include the construction of a new foundation and relocation of three existing water storage tanks for fire storage facilities. Additive Bid Alternate 2, includes the installation of approximately 840 linear feet of 6-inch fire line to a new fire hydrant located at the fire station and at the Placitas Community Library. Perform Work of Contract under a stipulated price basis with Owner in accordance with Conditions of Contract.

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is described as follows:
Sandoval County Placitas Fire Station 41 Water System Improvements

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Miller Engineers, Inc. d/b/a Souder, Miller & Associates (“Engineer”) who will act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. If only the Base Bid is awarded, the Work will be substantially completed within 75 calendar 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 105 calendar days after the date when the Contract Times commence to run.

- B. If the Base Bid and Additive Bid Alternate 1 and/or 2 is awarded, the Work will be substantially completed within 150 calendar 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 180 calendar 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 times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. 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 \$1,300.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A 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 Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,300.00 for each day that expires after such time until the Work is completed and ready for final payment.
 3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

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

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit, with an estimated total of all unit price work equivalent to \$ _____

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.

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*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the last day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 1.5% per month, or other rate mutually agreed between the Owner and Contractor prior to presentation of corresponding Application for Payment.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert 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.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent

to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. 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 Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
- F. 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.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. 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.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement (pages 1 to 7, inclusive).
 - 2. Performance bond (pages 1 to 3, inclusive).
 - 3. Payment bond (pages 1 to 3, inclusive).
 - 4. Contractor's Bid Form [EJCDC C-410] (pages 1 to 8, inclusive), plus required attachments to the Bid as stipulated in Article 7 of the Bid Form.
 - 5. General Conditions (pages 1 to 65, inclusive).
 - 6. Supplementary Conditions (pages 1 to 9, inclusive).
 - 7. Appendices as listed in the Index to Appendices of the Project Manual.
 - 8. Technical Specifications as listed in the table of contents of the Project Manual.
 - 9. Drawings listed on the attached sheet index.
 - 10. Addenda (numbers ___ to ___, inclusive).
 - 11. Attachments to this Agreement (enumerated as follows):
 - 12. 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.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, 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 Documents.

10.03 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.

10.04 Severability

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

10.05 Contractor's Certifications

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of 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.

10.06 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, 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 in the Supplementary Conditions.
- B. Non-Appropriations Clause: 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 Owner may immediately terminate this Agreement by giving the Contractor written notice of such termination. The Owner'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 Owner or the NMED or the State of New Mexico in the event of immediate or Early Termination of this Agreement by the Owner or the Department.
- C. Termination Clause: This contract is funded in whole or in part by funds made available under a NMED Grant Agreement. Should the NMED early terminate the grant agreement, the Owner may early terminate this contract by providing Contractor written notice of such termination. In the event of termination pursuant to this paragraph, the Owner's only liability shall be to pay Contractor or Vendor for acceptable goods delivered and services rendered before the termination date.

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

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

Sandoval County _____

By: _____

By: _____

Title: _____

Title: _____

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

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

License No.: _____
(where applicable)

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

Agency Concurrence:

Agency Concurrence:

As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments thereunder, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency: _____

By: _____

Date: _____

Title: _____

NOTICE TO PROCEED

Owner:	Sandoval County	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Souder, Miller & Associates	Engineer's Project No.:	6432107
Project:	Sandoval County Placitas Fire Station 41 Water System Improvements	Contract Name:	Sandoval County Placitas Fire Station 41 Water System Improvements
		Effective Date of Contract:	

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on _____, 20__.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____ thereafter.

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

Owner: _____
Authorized Signature

By: _____

Title: _____

Date Issued: _____

Copy: Engineer

PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: None See Paragraph 16

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

CONTRACTOR AS PRINCIPAL

SURETY

 Contractor's Name and Corporate Seal *(seal)*

 Surety's Name and Corporate Seal *(seal)*

By: _____
 Signature

By: _____
 Signature *(attach power of attorney)*

 Print Name

 Print Name

 Title

 Title

Attest: _____
 Signature

Attest: _____
 Signature

 Title

 Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall 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 shall 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 shall 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 shall 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 shall 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 shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall 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 shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, 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 may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after 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 shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall 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 shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall 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 shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

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

CONTRACTOR AS PRINCIPAL

SURETY

_____ *(seal)*

Contractor's Name and Corporate Seal

_____ *(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 satisfy 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 shall 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 shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall 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 shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall 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:
 1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 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;
 4. A brief description of the labor, materials, or equipment furnished;
 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;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
 - 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 shall be 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.
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:

CERTIFICATE OF INSURANCE

Certificate of Insurance to be inserted here, in accordance with the General Conditions and coverages as stipulated in the Supplementary Conditions.

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): Sandoval County	From (Contractor):	Via (Engineer): Souder, Miller & Associates
Project: Sandoval County Placitas Fire Station 41 Water System Improvements	Contract: Sandoval County Placitas Fire Station 41 Water System Improvements	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.: 6432107

**Application For Payment
Change Order Summary**

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

- 1. ORIGINAL CONTRACT PRICE..... \$ _____
- 2. Net change by Change Orders..... \$ _____
- 3. Current Contract Price (Line 1 ± 2)..... \$ _____
- 4. TOTAL COMPLETED AND STORED TO DATE
(Column F total on Progress Estimates)..... \$ _____
- 5. RETAINAGE:
 - a. X _____ Work Completed..... \$ _____
 - b. X _____ Stored Material..... \$ _____
 - c. Total Retainage (Line 5.a + Line 5.b)..... \$ _____
- 6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)..... \$ _____
- 7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
- 8. AMOUNT DUE THIS APPLICATION..... \$ _____
- 9. NEW MEXICO GROSS RECEIPT TAX..... 6.1250% \$ _____
- 10. AMOUNT DUE THIS APPLICATION INCL. NMGRT..... \$ _____

Contractor's Certification

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

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and

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

Contractor Signature

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

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

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

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

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

Approved by: _____ (Funding or Financing Entity (if applicable)) _____ (Date)

MONTHLY CONSTRUCTION PROGRESS CERTIFICATE Sandoval County Placitas Fire Station 41 Water System Improvements		CONTRACT NO.	
		PARTIAL PAYMENT ESTIMATE NO.	
OWNER: Sandoval County	CONTRACTOR:	CONTRACT PERIOD FROM: TO:	
Field Orders Issued This Period:			
1		Issued <input type="checkbox"/>	Under Review <input type="checkbox"/>
2		Issued <input type="checkbox"/>	Under Review <input type="checkbox"/>
3		Issued <input type="checkbox"/>	Under Review <input type="checkbox"/>
Change Orders/Contractor Claims This Period:		Changes in Contract	
		Days	Price
			\$ -
Under Review (Outstanding) <input type="checkbox"/> New <input type="checkbox"/> Settled <input type="checkbox"/>			\$ -
Under Review (Outstanding) <input type="checkbox"/> New <input type="checkbox"/> Settled <input type="checkbox"/>			\$ -
Under Review (Outstanding) <input type="checkbox"/> New <input type="checkbox"/> Settled <input type="checkbox"/>			\$ -
Under Review (Outstanding) <input type="checkbox"/> New <input type="checkbox"/> Settled <input type="checkbox"/>			\$ -
Under Review (Outstanding) <input type="checkbox"/> New <input type="checkbox"/> Settled <input type="checkbox"/>			\$ -
On Schedule? Yes <input type="checkbox"/> No <input type="checkbox"/>	Comments:		
Days Left for Completion			
Briefly Describe Project Progress During This Period:			
Issues Addressed During This Period (Indicate Any Issues That Remain Unresolved):			
Engineer's Attestation:	Owner Concurrence:	*Contractor Concurrence:	
X	X	X	
Signature	Signature	Signature	
Print Name	Print Name	Print Name	
Title	Title	Title	
* Contractor agrees this certificate is a complete account of all change orders/claims for this contract period, and all outstanding change orders/claims from previous contract periods and waives any rights to further adjustments in contract times or price for any change orders/claims that originated in this contract period.			

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Sandoval County	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Souder, Miller & Associates	Engineer's Project No.:	6432107
Project:	Sandoval County Placitas Fire Station 41 Water System Improvements	Contract Name:	Sandoval County Placitas Fire Station 41 Water System Improvements

This [preliminary] [final] Certificate of Substantial Completion applies to:

- All Work The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the 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.

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 shall be as provided in the Contract, except as amended as follows: *[Note: 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.]*

Amendments to Owner's responsibilities: None
 As follows

Amendments to Contractor's responsibilities: None
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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.

EXECUTED BY ENGINEER:		RECEIVED:		RECEIVED:	
By: _____	By: _____	By: _____	By: _____	By: _____	By: _____
(Authorized signature)	Owner (Authorized Signature)	Owner (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____	Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, 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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree 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 the 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. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *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.

37. *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 furnished by Owner which are designated for the use of Contractor.
38. *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.
39. *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.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.

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

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. 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. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), 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 executed 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 specifically 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 *Initial Acceptance of Schedules*

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

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items 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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the 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 Documents 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 Documents 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 shall 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 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 thereunder.
- 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 give written notice to Owner and Contractor 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 editions, 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. 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.
- E. Paragraph 8.03 governs 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.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times 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.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- 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; 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 7.12, 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 at law; 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 shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site 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 known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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 upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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 either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not shown or indicated 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), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; 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 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. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, 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.
- 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 or 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.H shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. 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, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *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 full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. 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 may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. 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.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. 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).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed 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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

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

7.02 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, 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.

7.03 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the 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 material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- 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 shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity 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 five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

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

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of 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

7.09 *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.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *Safety and Protection*

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

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when 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.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor 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).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall 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.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

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 threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

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.D.
 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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction 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 shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 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.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.

E. *Resubmittal Procedures:*

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

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. 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 shall 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 and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner 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, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.

- D. 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 shall 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 Documents (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 10.08. 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 *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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

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

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 2. *Work Change Directives:* 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 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate 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.

11.03 *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.

11.04 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or
 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 11.04.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 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. 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. The supporting data shall 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. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 shall be submitted 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; and
 - 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as 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 shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

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 on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 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 will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

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 shall 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 shall 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 shall 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 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 shall 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 special 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, 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 shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 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 on account of 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. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;
 - l. there are other items entitling 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 shall 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 shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall 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 seven 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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. *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.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- 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 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then 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 other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall 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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; 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 on account of loss of anticipated overhead, profits, or revenue, 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 seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 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, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph 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; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising 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; or
 - 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 Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

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 shall not constitute a waiver of that provision, nor shall 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 or completion of the Contract or termination 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 *Headings*

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

SUPPLEMENTARY CONDITIONS

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INTRODUCTION

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

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

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

AMENDED OR SUPPLEMENTED STANDARD GENERAL CONDITIONS

SC-1.01.A.49 Defined Terms

Add the following new paragraph immediately after Paragraph 1.01.A.48:

49. *Funding Agency*—State of New Mexico.

SC-2.05.B Video Documentation

Add the following new paragraph immediately after Paragraph 2.05.A:

- B. *Video Documentation*: Prior to beginning construction activities, the Contractor will furnish full-coverage video documentation of the entire construction site. The video must include coverage of all areas and adjacent features that may potentially be impacted by the impending construction work.
1. Prior to groundbreaking on any section of pipeline or site work, video documentation must be submitted to the Engineer for review and approval. Video documentation must be approved as sufficient by Engineer before groundbreaking may proceed.
 2. Show station markers, mailboxes, fences, structures, driveways, signs, culverts, landscape improvements, and other existing site features.
 3. Include project description, applicable stations or sites, and date taken in the file name of every video, using the following filename convention: "<project name>_<begin station>to<end station>(or <site descriptor>)_<date>".
 4. Video submittals may be rejected because of failure to include or document any of the items above, a lack of visual or audio clarity, or for any other deficiency that prevents the Owner/Engineer from easily viewing and documenting the pre-construction conditions of the pipeline and sites.
 5. Contractor must submit two (2) copies of the video documentation on Flash Drive format as part of the submittal process. One copy to Owner and one copy to Engineer.

SC-3.01.F Bidding Documents in Electronic Format

Add the following new subparagraph after subparagraph GC-3.01.E:

- F. For the present Project, Bidding Documents in electronic media format are furnished to bidding contractors for the sole purpose of preparing bids, and not for construction. The selected construction Contractor shall not rely on files provided in electronic media format for construction

but rather hard copies of such data provided by the Engineer or Owner upon award of the Contract.

SC-5.03 Subsurface and Physical Conditions

Add the following new paragraphs immediately after Paragraph 5.03.B:

- C. The following reports of explorations and tests of subsurface conditions at or contiguous to the Site are known to Owner:
 - 1. Report dated September 19, 2023, prepared by Geo-Test, Inc., entitled: "Geotechnical Engineering Services Report, No. 1-30804, Sandoval County Fire Station 41 Tank Relocation Project, Placitas, New Mexico", consisting of 18 pages. The "technical data" contained in such report upon which Contractor may rely is technical data.
- D. The reports and drawings identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

SC-5.04 Differing Subsurface or Physical Conditions

Add the following new paragraph immediately after Paragraph 5.04.D:

- E. The circumstances and potential resulting actions described in Paragraphs 5.04.A, B, C and D do not apply in the case of subsurface or surface rock or soils. The Contractor is advised that the results of the exploration and tests of subsurface conditions at the Site as presented in the geotechnical investigation referenced in SC-5.03.C.1, are given only as an attempt to provide the Contractor with a general idea of what subsurface conditions might be expected, and Owner is not responsible for any discrepancies or inaccuracies. No additional payment will be made for rock removal and disposal, nor the importing of special bedding/backfill material to meet the specifications, nor special excavation methods required to trench in rock. In all cases, all such work will be considered incidental to the cost of related work.

SC-5.05 Underground Facilities

Delete Paragraphs 5.05.B, C, D and E in their entirety and insert the following in their place:

- B. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy (as defined in §62-14-5 NMSA 1978) in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. The Contractor will proceed to work with the underground facility owner to relocate, preserve or remove the undocumented or inaccurately marked underground facility to complete contract work. Compensation for such work, if any, will be negotiated by and between the Contractor and the facility owner, with no claim to the Owner by the Contractor for costs associated for resulting delays (Section 4.C, §62-14-5 NMSA 1978).
- C. Concurrently the Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document

- b. Employer's Liability:
 - \$ 100,000 each accident
 - \$ 100,000 disease-each employee
 - \$ 500,000 disease-policy limit
- 2. Commercial General Liability (including Products and Completed Operations):
 - a. Occurrence Form
 - \$1,000,000 each occurrence
 - \$2,000,000 general aggregate
 - \$1,000,000 products - completed operations
- 3. Business/Commercial Automobile Liability:
 - a. Combined Single Limit
 - \$1,000,000 or, equivalent split limits for Bodily Injury & Property Damage
- 4. Umbrella Excess Liability:
 - \$1,000,000 each occurrence
 - \$1,000,000 aggregate
- 5. The Contractor shall require each of his subcontractors to procure and to maintain during the life of his subcontract, General Liability Insurance of the type and in the same amounts as specified in the preceding paragraph.
- 6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following:

SC-7.06.A Subcontractors

Amend Paragraph 7.06.A by adding the following text to the end of the Paragraph:

The Contractor shall not award work valued at more than fifty percent (50%) of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.12 Safety and Protection

Add the following new paragraphs immediately after Paragraph 7.12.G:

- H. In accordance with OSHA stipulations, there may be locations within the project that are determined to be confined spaces, and possibly permit-required confined spaces. It is solely the Contractor's responsibility to determine where special permits may be required and to apply for and obtain any required permit and to subsequently assure compliance with all provisions of the permit on the part of Contractor's personnel and that of all Subcontractors. The cost of obtaining and implementing such permits shall be considered incidental to related work. No additional compensation will be made by the Owner. The Contractor's safety program must include reference to such permit requirements as well as a copy of the permit, and Owner and Engineer must be informed of all specific requirements related to entry, per Paragraph 7.12.D.
- I. Contractor shall provide two (2) copies of the safety plan to the Engineer prior to commencing construction (one shall be for Owner's files). Neither the Owner nor Engineer shall approve or comment on the Contractor's safety plan, nor shall the Owner or Engineer assume any responsibility for assuring compliance on the part of personnel on site, other than Owner's or Engineer's employees and representatives, as stipulated in Paragraph 7.12.D.

SC-7.13.B Contractor Safety Representative

Add the following new paragraph immediately after Paragraph 7.13.A:

- B. Contractor Safety Representative shall personally confer with the Resident Project Representative and Engineer at least once prior to commencement of the Work and at least once per week during Project execution.

SC-7.16 Submittals

Add the following new paragraphs immediately after Paragraph 7.16.E:

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

SC-10.03 Project Representative

Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.
 - 1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
 - 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 - 3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 - 4. Liaison:
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

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

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-11.07.A Execution of Change Orders

Replace the existing paragraph with the following as Paragraph 11.07.A:

Owner and Contractor shall execute appropriate Change Orders recommended by Engineer and approved by Funding Agency, if applicable, covering:

SC-14.04 Acceptance of Defective Work

Replace the existing Paragraph 14.04.A with the following:

- 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, and to Funding Agency's approval). 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 shall 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.

SC-15.01.D, 15.06.D, 16.04.A, and 16.04.B Notice of Extended Payment Provision

This contract allows the Owner to make payment within forty-five (45) days after submission of an undisputed request for payment. Therefore Paragraphs 15.01.D, 15.06.D, 16.04.A and 16.04.B shall hereby reference a period of forty-five (45) days for Owner to effect payment instead of ten (10) days and/or thirty (30) days.

SC-16.05 Notice of Stop Work or Termination

Add the following new paragraph SC-16.05 immediately after Paragraph SC-16.04:

SC-16.05 Notice of Stop Work or Termination

- A. If the project is suspended or terminated by the Owner or Contractor, a written notice must be submitted to the Funding Agency seven days prior to said termination or suspension.

SC-18.09 New Mexico State Requirements

Add the following language after Article 18.08 with the title “New Mexico State Requirements”:

- A. There shall be no discrimination against any employee or applicant for employment because of race, color, creed, sex, religion, sexual preference, ancestry or national origin.

WORK CHANGE DIRECTIVE NO. _____

Date of Issuance:	Effective Date:
Owner: Sandoval County	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Souder, Miller & Associates	Engineer's Project No.: 6432107
Project: Sandoval County Placitas Fire Station 41 Water System Improvements	Contract Name: Sandoval County Placitas Fire Station 41 Water System Improvements

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

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

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

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

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

Contract Price \$ _____ [increase] [decrease].
 Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum
- Unit Price
- Cost of the Work
- Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

CHANGE ORDER NO. _____

Date of Issuance:	Effective Date:
Owner: Sandoval County	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Souder, Miller & Associates	Engineer's Project No.: 6432107
Project: Sandoval County Placitas Fire Station 41 Water System Improvements	Contract Name: Sandoval County Placitas Fire Station 41 Water System Improvements

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

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (if required)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

FIELD ORDER NO. _____

Date of Issuance:	Effective Date:
Owner: Sandoval County	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Souder, Miller & Associates	Engineer's Project No.: 6432107
Project: Sandoval County Placitas Fire Station 41 Water System Improvements	Contract Name: Sandoval County Placitas Fire Station 41 Water System Improvements

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____
Specification(s) Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

APPENDIX A

**Minimum Wage Rate Determination
by the New Mexico Department of Workforce Solutions**

**GEOTECHNICAL ENGINEERING
SERVICES REPORT
NO. 1-30804**

**SANDOVAL COUNTY
FIRE STATION 41
TANK RELOCATION PROJECT**

PLACITAS, NEW MEXICO

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**PREPARED FOR:
SOUDER MILLER & ASSOCIATES**

September 19, 2023
Job No. 1-30804

Souder Miller & Associates
5454 Venice Ave. NE, Suite D
Albuquerque, NM 87113

ATTN: Keaton Chancellor

RE: Geotechnical Engineering Services Report
Sandoval County Fire Station 41
Tank Relocation Project
Placitas, NM

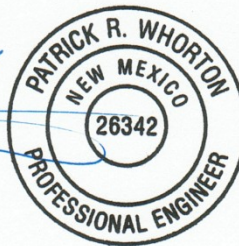
Dear Mr. Chancellor:

Submitted herein is the Geotechnical Engineering Services Report regarding the above referenced project. The report contains the results of our field investigation, laboratory testing and recommendations for tank foundation and retaining wall design as well as excavation, fill and general site grading criteria.

It has been a pleasure to serve you on this project. If you should have any questions or concerns regarding the report or aspects of the investigation please contact our office.

Respectfully submitted:
GEO-TEST, INC.

Patrick R. Whorton, PE



Reviewed By:

Patrick J. Byres, PE

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INTRODUCTION

This report presents the results of the geotechnical engineering services investigation performed by this firm for the proposed Sandoval County Fire Station 41 Tank Relocation project located in Placitas, New Mexico.

The objectives of this investigation were to:

- 1) Evaluate the nature and engineering properties of the subsurface soils underlying the site.
- 2) Provide recommendations for tank foundation and retaining wall design as well as excavation, fill and general site grading.

The investigation includes subsurface exploration, selected soil sampling, laboratory testing of the samples, performing an engineering analysis and preparation of this report.

PROPOSED CONSTRUCTION

It is understood that the project consists of the installation of three (3) new 10,000 to 15,000 gallon steel welded water tanks on the east side of the existing fire station. The larger tanks will have a diameter of 15 feet with unit loading on the base of the tanks not anticipated to exceed 1,000 pounds per square foot. The tanks will be founded on reinforced concrete slabs on grade partially bordered by a wall retaining approximately 2 feet of soil.

Should structural loads or other project details vary significantly from those outlines above, this firm should be notified for review and possible revision of the recommendations contained herein.

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FIELD EXPLORATION

One (1) exploratory boring was drilled to a depth of 15 feet below existing grades within the proposed tank footprints. The boring location is shown on the attached Boring Location Map, Figure 1. The soils encountered in the borings were continuously examined, visually classified and logged during the drilling operation. The boring logs are presented in a following section of this report. Drilling was accomplished using a truck mounted drill rig equipped with 2.25 inch inner diameter hollow stem auger. Subsurface soils within the building footprint were sampled at five-foot intervals or less utilizing an open tube split barrel sampler driven by a standard penetration test hammer.

LABORATORY TESTING

Selected samples were tested in Geo-Test, Inc. laboratories to determine certain engineering properties of the subsurface soils encountered in the field investigation. Moisture contents were determined to evaluate the various soil deposits with depth. The results of these tests are shown on the Boring Logs.

Sieve analysis and Atterberg limits testing was performed to aid in soils classification. The results of these tests are presented in the Summary of Laboratory Results and on individual test reports presented in a following section of this report.

SURFACE CONDITIONS

The proposed tank farm site is located on the east side of the existing fire station. The western portion of the area is currently paved with asphalt and used as a parking area. East of the parking area is relatively undisturbed native grades populated with native shrubs and grasses, see Photo 1. The native/undisturbed portion of the site is approximately 1 to 3 feet higher in elevation than the parking area. It is understood that the tank foundation slabs will bear at or near the current elevation of the parking area requiring excavation into the native

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soils and the construction of a retaining wall along the east and south sides of the tank farm.

SUBSURFACE SOIL CONDITIONS

As indicated by the exploratory boring, the subsurface soils beneath the proposed tank site consisted of very firm to hard medium plasticity clayey sand with gravel which was encountered at the surface and extended to a depth of 7 feet below surface grades where firm medium plasticity clay was encountered and extended to the full depth explored.

No free groundwater was encountered in the borings and soil moisture contents were relatively low throughout the extent of the borings.

CONCLUSIONS AND RECOMMENDATIONS

The near surface soils underlying the site were found to be very firm to hard in their present condition and are considered suitable to provide reliable support of the proposed tanks. As such, the proposed tank foundations may be founded directly on densified native soils, or on properly compacted structural fill if required for grading purposes. It is not recommended that a combination of bearing surfaces be used for the support of the structures due to the potential for excessive differential settlements. Each foundation should be founded entirely on compacted native soil or structural fill, not a combination of both.

Accordingly, the proposed tanks be may founded on well reinforced concrete slab (AWWA Type 2) bearing directly on densified native soils or properly compacted fill, if required for grading purposes. Detailed recommendations for tank foundation design and the required site grading are presented in the following sections of this report.

Post-construction moisture increases in the supporting soils would cause some differential foundation settlement and could create excessive movement, at least in some areas of the site. Therefore, moisture protection is considered an important design consideration

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and should be reflected in overall site grading and drainage details as recommended in the Moisture Protection section of this report.

FOUNDATIONS

The proposed storage tanks may be supported on monolithically placed concrete slabs on grade with perimeter turndowns bearing directly onto prepared native soils or properly compacted structural fill, if required for grading purposes. The turndown edges should be well reinforced, have a minimum width of 12 inches and should bear a minimum of 2.0 feet below the lowest adjacent surface grade for frost protection purposes. The turndown edge may also be incorporated as a foundation for the proposed retaining wall at the discretion of the project structural engineer provided the turndown is sized and adequately reinforced to resist lateral soil pressures discussed in a later section of this report.

An allowable bearing pressure of 2,000 pounds per square foot is recommended for foundation design. This bearing pressure applies to full dead plus realistic live loads and can be safely increased by one-third for total loads including wind and seismic forces.

The slab on grade portion of the foundation should be founded directly onto densified native soils or properly compacted structural fill. The slab should be reinforced, as appropriate, to provide structural continuity and to span local load irregularities.

A modulus of subgrade reaction of 200 pounds per square inch per inch of deflection (pci) is recommended for use in a non-rigid design such as a two-dimensional finite element method.

It is estimated that total settlement of the tank foundations, designed and constructed as recommended herein, will not exceed about 1.0 inch. Differential movement, or tilt across the entire tank bottom, is estimated to be less than 0.5 inches. The above settlement estimates are based upon the soil moisture contents encountered during test drilling or moisture contents introduced during construction. Post construction moisture increases in the supporting soils could create additional movements and, thus, the moisture protection procedures as

recommended in a following section of this report are considered important for the satisfactory performance of the tank structures.

RETAINING WALL DESIGN

Site retaining walls which are structurally independent of the tank foundations and will retain less than 4.0 feet of material may be supported on shallow spread-type footings bearing directly on densified native soils or on properly compacted structural fill , if required for grading purposes and placed as detailed in the Site Grading section of this report.

An allowable soil bearing capacity of 2,000 pounds per square foot is recommended for independent retaining wall footing design. This bearing capacity applies to full dead loads plus realistic live loads and may be safely increased by one-third for total loads including wind and seismic forces. Independent retaining wall footings should be established a minimum of 2.0 feet below lowest adjacent finished grade. The minimum recommended width of continuous footings is 1.33 feet.

Total settlements of independent site retaining wall foundations designed and constructed as recommended above are estimated not to exceed $\frac{3}{4}$ inch for the soil moisture contents encountered during this investigations or moisture contents introduced during construction. Differential movements should be less than 75 percent of total movements. Significant post-construction moisture increases in the foundation supporting soils could create additional movements such that the moisture protection provisions included in the Moisture Protection section of this report are considered critical to the satisfactory performance of the retaining walls.

Lateral pressure against retaining walls will depend upon the degree of restraint. Walls which are restrained so as to limit movement at the top of the wall to less than 0.001 times the height of the wall should be designed for an 'at rest' earth pressure of 55 pounds per square foot per foot of depth. Walls free to move at the top should be designed using an 'active' earth pressure equal to 35 pounds per square foot per

foot of depth. These recommended lateral pressures are applicable to a condition of horizontal backfill without surcharge loads. Analysis of earth pressures produced by sloping backfill or surcharge loads may be provided by this firm upon request.

The lateral pressures presented above assume no buildup of hydrostatic pressures behind the walls. To prevent the buildup of hydrostatic pressure, adequate weep holes should be provided or composite drainage systems such as Miradrain or equivalent may be installed on the backside of the wall prior to backfilling. The drainage layer should be connected to a collector pipe at the base of the walls and routed to a sump or to a positive gravity drain.

Retaining wall backfill should meet the structural fill specifications outlined in the Site Grading section of this report. During backfilling, the contractor should be limited to the use of hand operated equipment within a zone of about 3 feet horizontally from the back of the wall. The use of heavier equipment could apply lateral pressures well in excess of the recommended design earth pressure particularly over the upper portions of the wall.

SITE GRADING

The following general guidelines should be included in the project construction specifications to provide a basis for quality control during site grading. It is recommended that all structural fill and backfill be placed and compacted under engineering observation and in accordance with the following:

- 1) After the site has been cleared and grubbed, and site excavated to foundation bearing elevation, the soils exposed at the base of the excavation should be densified before the placement of foundations or structural fill.
- 2) Excavated slopes for foundation and utility construction should be designed and constructed in accordance with 29 CFR 1926, Subpart P as well as any applicable state or local regulations. Excavated temporary and permanent slopes should not exceed

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1.5 to 1 (horizontal to vertical). Excavation of the surficial soils may be readily accomplished using normal earth moving equipment.

- 3) Densification of the exposed native soils should consist of scarifying to a depth of 12 inches, moisture conditioning to the optimum moisture content or above and compacted to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557.
- 4) The results of this investigation indicate that a portion of the on-site soils will be suitable for use as structural fill given blending and processing to meet the specifications presented below. Any imported material must also meet the criteria for structural fill.
- 5) All structural fill and backfill should be free of vegetation and debris and contain no rocks larger than 3 inches. Gradation of the backfill material, as determined in accordance with ASTM D-422, should be as follows:

Sieve Size Square Openings	Percent Passing by Dry Weight
3 inch	100
No. 4	40 -100
No. 200	15 - 45

- 6) The plasticity index of the structural fill should be no greater than 15 when tested in accordance with ASTM D-4318.
- 7) Structural fill consisting of soils approved by the geotechnical engineer shall be placed in 8 inch loose lifts and compacted with approved compaction equipment. Loose lifts should be reduced to 4 inches in handheld compaction equipment is used. All compaction of fill or backfill shall be accomplished to a minimum of 95 percent of the maximum dry density as determined in accordance with ASTM D-1557. The moisture content of the structural fill during compaction should be within 2 percent of the optimum moisture content.

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- 8) Tests for degree of compaction should be determined by ASTM D-1556 (Sand Cone) or ASTM D-6938 (Nuclear Method). Observation and field tests should be carried on during fill and backfill placement by the geotechnical engineer to assist the contractor in obtaining the required degree of compaction. If less than 95 percent is indicated, additional compaction effort should be made with adjustments to the moisture content as necessary until 95 percent compaction is obtained.

MOISTURE PROTECTION

Precautions should be taken during and after construction to minimize moisture increases in foundation bearing soils which can weaken or cause other changes in the soils supporting the tank foundation which may cause differential movement of the foundations and may result in cosmetic or structural damage to the tank.

Positive drainage should be established away from the perimeter of the tank foundation. A typical adequate slope is 6 inches in the first five feet with positive drainage being provided from those points to streets, pavement or natural water courses. If necessary to provide positive drainage, the building area should be raised above adjacent grades with structural fill. Should lot size or other factors impede positive drainage away from the tank to less than 5 feet from foundations, a non-perforated drain system should be installed to carry water to a minimum of five feet from foundations or to streets or natural water courses.

Utility backfill should be well compacted and should meet the specifications outlined within the Site Grading section of this report. Special care should be taken during installation of the subfloor sewer and water lines to reduce the possibility of future subsurface saturation.

Irrigation within 10 feet of foundations is discouraged or at the very least should be carefully controlled. Proper landscaping and drainage maintenance are required to preclude accumulation of excessive

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moisture in the soils below the structure and throughout the site. This should include but is not limited to routine maintenance checks of the irrigation system to ensure no leakage and proper functionality and that irrigation is adjusted and maintained seasonally so that over watering does not occur. Native drought resistant plants are recommended for use in landscaping. Landscape features should not impede positive drainage away from foundations as recommended above.

The foregoing recommendations should only be considered as minimum requirements of overall site development. It is recommended that a civil/drainage engineer be consulted for more detailed grading and drainage recommendations.

FOUNDATION REVIEW AND INSPECTION

This report has been prepared to aid in the evaluation of the subject site and to assist in the design of this project. It is recommended that the geotechnical engineer be provided the opportunity to review the final design drawings and specifications in order to determine whether the recommendations in the report are applicable to final design. Review of the final design drawings and specifications should be noted in writing by the geotechnical engineer.

In order to permit correlation between the conditions encountered during construction and to confirm recommendations presented herein, it is recommended that the geotechnical engineer be retained to perform continuous observations and testing during the earthwork portion of this project. Observation and testing should be performed during construction to confirm that suitable fill soils are placed upon competent materials and properly compacted and that foundation elements penetrate the recommended soils.

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CLOSURE

Our conclusions, recommendations and opinions presented herein are:

- 1) Based on our evaluation and interpretation of the findings of the field and laboratory programs.
- 2) Based on an interpolation of soil conditions between and beyond the explorations.
- 3) Subject to confirmation of the conditions encountered during construction.
- 4) Based upon the assumption that sufficient observation will be provided during construction.
- 5) Prepared in accordance with generally accepted professional geotechnical engineering principle and practice.

This report has been prepared for the sole use of Souder Miller & Associates specifically to aid in the design of the proposed Sandoval County Fire Station 41 Tank Relocation project located in Placitas, NM and not for use by a third party without consent.

We make no warranty, either expressed or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions encountered during construction appear to be different than indicated by this report, this office should be notified.

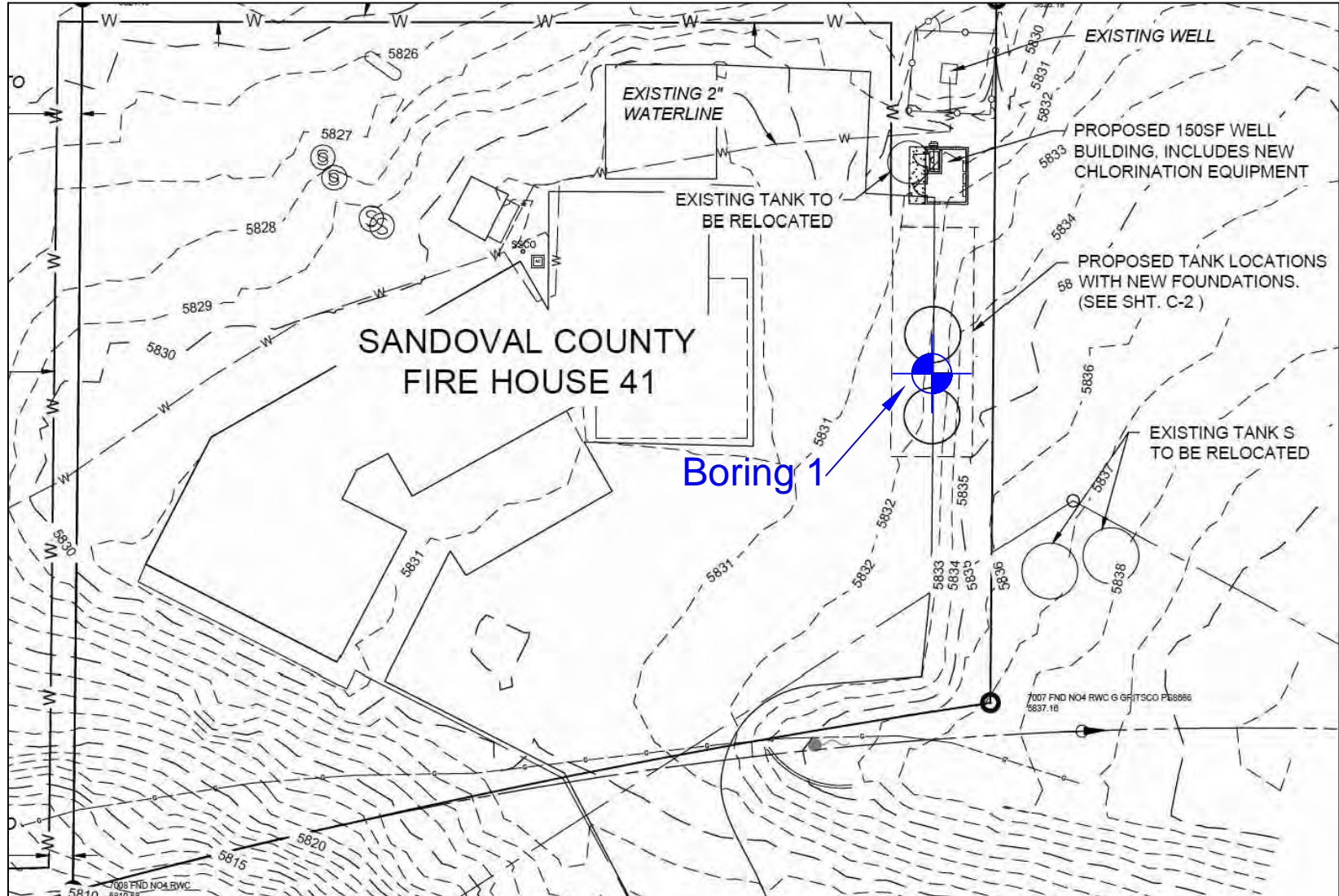
All soil samples will be discarded 60 days after the date of this report unless we receive a specific request to retain samples for a longer period of time.

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BORING LOCATION MAP



Fire Station 41 - Tank Relocation Project
Placitas, New Mexico
Job No. 1-30804

Figure 1



GEO-TEST
GEOTECHNICAL ENGINEERING
AND MATERIAL TESTING



Project: FS 41 Tank Relocation

1-30804

Photo 1: Tank Farm Location

GEO-TEST



Project: FS 41 Tank Relocation

Date: 08/30/2023

Project No: 1-30804

Elevation:

Type: 2.25" ID HSA

LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 1

During Drilling: none

After 24 Hours:

DEPTH (Ft)	LOG	SAMPLE INTERVAL	SAMPLE					SUBSURFACE PROFILE					
			TYPE	N. BLOWS/FT	MOISTURE %	DRY DENSITY (pcf)	USC	DESCRIPTION	N blows/ft				
									20	40	60	80	
0-5			AC		5			SC	CLAYEY SAND, medium plasticity, dry, light brown/white				
5-10			SS	10-19-17 36	2			SC	CLAYEY SAND with GRAVEL, medium plasticity, very firm to hard, dry, light brown				
			SS	19-25-25 50									
10-15			SS	7-9-5 14	7			CL	SANDY CLAY, medium plasticity, firm, slightly moist, brown/white				
			SS	9-11-11 22	8								
15-20									Stopped Auger @ 14 feet Stopped Sampler @ 15.5 feet				

LOG OF TEST BORING 1-30804.GPJ GEO TEST.GDT 9/18/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve

AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

SUMMARY OF LABORATORY RESULTS

						SIEVE ANALYSIS PERCENT PASSING											
TEST HOLE	DEPTH (FEET)	UNIFIED CLASS	(%) MOIST	LL	PI	NO 200	NO 100	NO 40	NO 10	NO 4	3/8"	1/2"	3/4"	1"	1 1/2"	2"	4"
1	1.0	SC	4.6	33	15	47	63	71	82	91	97	98	100				
1	4.0	SC	2.5	27	12	25	34	40	56	67	75	78	87	91	100		
1	10.0		6.6														
1	15.0		8.3														

SUMMARY OF LABORATORY RESULTS 1-30804.GPJ GEO TEST.GDT 9/18/23



LL = LIQUID LIMIT
PI = PLASTICITY INDEX
NP = NON PLASTIC or NO VALUE

Project: FS 41 Tank Relocation
Location: Placitas, NM
Number: 1-30804



SUBMITTALS CHECKLIST

Project Name:

Sandoval County Placitas Fire Station 41

Water System Improvements Project

Project Number:

6432107

Item	Date Received	Approved	Not Approved	Comments
Testing and Misc.				
Compaction				
Concrete				
Pressure Tests				
Disinfection Tests				
Video of Existing Site Conditions				
Site Civil / Earthwork				
Engineered Fill Material				
Gravel				
Base Course				
Stormwater Controls				
Riprap				
Wire cage material				
Epoxy-coated stakes				
Waterline / Pipe Fittings				
Ductile Iron Pipe				
Polyethylene pipe wrap				
PVC Waterline Pipe				
Pipe Fittings				
Glands, Gaskets, Tee Bolts				
Joint Restraints Harness				
Detectable Warning Tape				
Tracer Wire				
Marker posts				
Open/shut-off valve tool				
Valves				
Gate Valves				
Cast Iron Valve Box				
Comb. Air/Vacuum Valves				
Curb Valve				
Corporation Stop				
Meter Box				
Tapping Saddle				
Polyethylene Pipe				
Vault Lid				
Dresser Coupling				
Flap Valves				
Hydrants				
Fire Hydrants				
Fire Hydrant Key				
Chemical Metering Pump				
Injection Fittings/Hoses				
Chlorination Building				
Concrete Tests				
Pre-Engineered Building Shop Drawings				
Air Release Valve				
Magnetic Flow Meter				

Item	Date Received	Approved	Not Approved	Comments
Schedule 40 Steel Pipe				
PVC Schedule 80 Pipe				
2" Check Valve				
Unions, Elbows and Fittings				
Reduced Pressure Principle Backflow Preventor				
Louvered Vent				
Exhaust Fan				
Pipe Insulation				
Heat Trace				
Ball Valve				
Check Valve				
Y-Strainer				
Wall Heater				
Pump Controls				
Pressure Switch				
Well Pump Protector				
Well Pump				
Electrical Supply				
O & M Manual				
Raceway and Boxes				
Metal Conduit and Tubing				
Nonmetallic Conduit				
Fittings				
Boxes, Enclosures, Cabinets				
Handholes and UG Boxes				
Underground Ducts and Raceways				
Conduit				
Accessories				
Warning Tape				
Identification for Electrical				
Identification Materials				
Identification Schedule				
Item				
Transformers				
Transformer Product Data				
Transformer Shop Drawings				
Test Reports				
Panelboards				
Load Center Product Data				
Protective Device Product Data				
TVSS Product Data				
Load Center Shop Drawings				
Panel Schedules				
Test Reports				
Wiring Devices				
Receptacles				
Switches & Occupancy Sensors				
Device Cover Plates				
Test Reports				
Fuses				
Product Data for Fuses				
Enclosed Switches				

Item	Date Received	Approved	Not Approved	Comments
Fusible Switches				
Test Reports				
Lighting				
Interior Light Fixtures				
Exterior Light Fixtures				
Test Reports				

Important Note: The items listed on this form require submittal data. However, this list should not be considered all inclusive. If Technical Specifications or the Drawings include other submittal requirements, those must be met as well. Also, the Engineer may require additional submittals beyond those identified above and/or in the Specifications and Drawings.

TECHNICAL SPECIFICATIONS

SECTION 01 00 00
BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Summary:
 - 1.2: Contract description.
 - 1.3: Special considerations.
 - 1.4: Work by Owner.
 - 1.5: Contractor's use of premises.
 - 1.6: Specification conventions.
 - 1.7: Minimum wage rate determination.

- B. Price and Payment Procedures:
 - 1.8: Allowances
 - 1.9: Schedule of values.
 - 1.10: Applications for payment.
 - 1.11: Change procedures.
 - 1.12: Unit prices.
 - 1.13: Alternates.

- C. Administrative Requirements:
 - 1.14: Coordination.
 - 1.15: Suspension of Work.
 - 1.16: Field engineering.
 - 1.17: Pre-Construction Conference.
 - 1.18: Progress meetings.
 - 1.19: Cutting and patching.

- D. Submittals:
 - 1.20: Submittal procedures.
 - 1.21: Construction progress schedules.
 - 1.22: Proposed products list.
 - 1.23: Product data.
 - 1.24: Shop drawings.
 - 1.25: Test reports.
 - 1.26: Manufacturer's instructions and certificates.

- E. Quality Requirements:
 - 1.27: Quality control.
 - 1.28: Tolerances.
 - 1.29: References.
 - 1.30: Manufacturer's field services and reports.
 - 1.31: Examination.

- F. Temporary Facilities and Controls:
 - 1.32: Temporary services.
 - 1.33: Access roads.
 - 1.34: Progress cleaning and waste removal.
 - 1.35: Project identification.
 - 1.36: Barriers and fencing.
 - 1.37: Protection of installed work.
 - 1.38: Security.
 - 1.39: Water control.
 - 1.40: Pollution and environmental control.
 - 1.41: Removal of utilities, facilities, and controls.

- G. Product Requirements:
 - 1.42: Products.
 - 1.43: Delivery, handling, storage, and protection.
 - 1.44: Substitutions.

- H. Execution Requirements:
 - 1.45: Closeout procedures.
 - 1.46: Final cleaning.
 - 1.47: Starting of systems.
 - 1.48: Demonstration and instructions.
 - 1.49: Testing, adjusting and balancing.
 - 1.50: Protecting installed construction.
 - 1.51: Project record documents.
 - 1.52: Operation and maintenance data.
 - 1.53: Spare parts and maintenance materials.
 - 1.54: Warranties and product registration.

1.2 CONTRACT DESCRIPTION

- A. Work of the Project includes the installation of a new well building to be able to relocate the chlorination equipment and hydro-pneumatic pressure tank out from the current location within the fire house and the installation of a new plumbing manifold equipped with a new master meter, and reduced pressure zone backflow prevention. This project also includes Additive Bid Alternate 1 to include the construction of a new foundation to be able to relocate three existing water storage tanks for fire storage facilities. Additive Bid Alternate 2, includes the installation of approximately 880 linear feet of 6-inch fire line to a new fire hydrant located at the fire station and at the Placitas Community Library. Perform Work of Contract under a stipulated price basis with Owner in accordance with Conditions of Contract.

1.3 SPECIAL CONSIDERATIONS

- A. Contractor is responsible for restoring the site to original or better condition at the Contractor's expense. Site restoration including temporary erosion control provisions is a prerequisite for periodic and final payment.

- B. Should nesting of a species protected under the Migratory Bird Treaty Act be identified in the construction zone, construction will be limited to a time of year outside the general migratory bird nesting season of March through August, avoided until nesting is complete, or the nest will be relocated by a properly trained and authorized expert.
- C. The Contractor must backfill and close all trenches at the end of the day and submit a stamped and certified traffic control plan for Engineers and Owners approval prior to construction. No open excavations shall be left open at the end of each day.
- D. Contractor will be responsible for re-grading the existing road and replacing base course to restore to original or better condition.
- E. Contractor must provide water for construction at the Contractor's expense. The Owner has indicated that water can be made available for purchase.
- F. Contractor shall submit a Testing and Disinfection schedule to the Engineer for approval prior to performing the respective activities. Hydrostatic testing of the waterline, disinfection and bacteriological testing shall follow specifications outlined in Section 33 11 00 Water Utility Distribution Piping, 33 13 00 Disinfection of Water Distribution, AWWA C600, AWWA C605, AWWA C651 and New Mexico Standard Specifications for Public Works Construction.
- G. Prior to beginning construction activities, the Contractor must furnish full-coverage video documentation of the entire construction site, per SC-2.05.B of the EJCDC C-800 Supplementary Conditions. The video must include coverage of all areas and adjacent features that may potentially be impacted by the impending construction work. Contractor must submit two (2) copies of the video documentation on flash drives as part of the submittal process.
- H. Contractor shall prepare record drawing information under the direction of a Licensed Professional Surveyor. Refer to Article 1.51 Project Record Documents below and General Notes on the Drawings for specific requirements related to As-Built Drawings.
- I. Contractor shall coordinate with Owner for tie-in to existing infrastructure. Contractor shall notify Engineer prior to performing the respective activities.
- J. Contractor must maintain a full set of Drawings and Technical Specifications at the construction site at all times throughout the construction process. All subcontractors must possess at least all Drawings and Technical Specifications pertaining to their portion of the work while on the construction site at all times.
- K. Contractor shall be responsible for notifying residents of construction. Access to driveways must be maintained at all times.
- L. Construction work will generally not be permitted on the following Federal-recognized holidays: New Year's Day, Martin Luther King, Jr.'s Birthday, President's Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Indigenous People's Day, Veterans' Day, Thanksgiving Day, and Christmas Day. When any of the above holidays fall on a Saturday and the preceding Friday is established as a holiday for Government

employees, or when any of the above holidays fall on a Sunday and the Monday following that day is established as a holiday for Government employees, no construction will be permitted on those days. However, the Owner, when in his/her opinion it is justified, may grant the Contractor permission to work on any of the above days upon advance written request by the Contractor.

- M. Upon completion of the Work, ground surfaces will be restored to their original condition by grading, and seeding with native plant species.
- N. In the event the Contractor encounters items of historical importance, the Engineer and the Owner shall be notified immediately and the work in the area shall immediately cease. Activity will cease until the Owner has consulted the Resident Project Representative and informed the Contractor of any steps to be taken or told to proceed with construction.
- O. Contractor shall confine operations to the construction site. Contractor shall be responsible for obtaining permission for any activity outside of the established and approved construction areas.
- P. Contractor shall propose and get approval from Owner of an area to store construction debris including unsuitable material from site grading and/or excavation where it will not be a nuisance. All debris shall be contained in such a manner that will prevent scattering. All debris, including trees and undergrowth, shall be disposed of properly within a properly permitted landfill. All debris shall be removed from the site prior to substantial completion. The handling, storage, and disposal of debris is incidental to the project.
- Q. Contractor shall implement the necessary site erosion control devices for inhibiting dust, wind, and air sediment movement offsite throughout construction in accordance with NPDES Best Management Practices and in accordance with the project SWPPP, if applicable.

1.4 WORK BY OWNER

- A. Not Applicable.

1.5 CONTRACTOR'S USE OF PREMISES

- A. No work shall be done before 7:00 A.M. or after 7:00 P.M., local time on a working day, on Sundays, or on legal holidays, except as necessary for the proper care and protection of work already performed, or during emergencies. For work on Saturdays, Contractor must request permission from the Engineer at least a week in advance.
- B. The Contractor shall make every effort to minimize noise caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise.
- C. The Contractor shall restrict his operations as nearly as possible to the immediate site. Unnecessary cutting of vegetation adjacent to the site is prohibited. Every effort shall be

made to minimize erosion during and after construction and the site shall be returned to its original condition, except where improvements are indicated or required.

- D. The Contractor shall take affirmative action to prevent the misuse of the natural environment, wasting of natural resources, or destruction of natural values.
- E. The Contractor shall conform to all requirements set forth in the latest edition of the New Mexico Standard Specifications for Public Works Construction with latest revision, and Occupational Safety and Health Administration Regulations for trenching, shoring and excavation, and all other activities where such regulations apply. The Contractor and all subcontractors shall conduct all activities in conformance with federal and state laws and regulations relating to occupational health and safety. Authorized inspectors from NMED's Occupational Health and Safety Bureau shall have unobstructed access to project sites and shall not be impeded in any way from performance of their duties.

1.6 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.
- B. The Contractor shall furnish all materials, labor, plant and equipment necessary to complete the contract work as called for by the Technical Specifications and as indicated on the Drawings. Material and work, either expressed or implied, necessary for the satisfactory completion of the contract work shall be considered an integral part thereof.
- C. All standards incorporated herein by reference shall be the latest edition, unless otherwise specified. The abbreviations and applicable standards are described below:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AIA	American Institute of Architects
ANSI	American National Standards Institute, Inc.
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CID	Construction Industries Division of the NM Regulation and Licensing Department
EJCDC	Engineers Joint Contract Documents Committee
EPA	Environmental Protection Agency
IBC	International Building Code
ISO	International Organization for Standardization
MSJC	Masonry Standards Joint Committee
NACE	National Association of Corrosion Engineers
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Department of Environment
NMSSPWC	New Mexico Standard Specifications for Public Works Construction
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
SAE	Society of Automotive Engineers
SSPC	Steel Structure Painting Council
UL	Underwriters Laboratories, Inc.

1.7 MINIMUM WAGE RATE DETERMINATION

- A. Article 13-4-11, NMSA, 1978, requires that prevailing local wages be determined by labor category, and that this prevailing wage be the minimum acceptable pay rate. The Public Works Minimum Wage Act covers all public works construction, alteration, demolition, or repair projects when the project cost is \$60,000 or more, and when the state or any political subdivision is a party. The wage rate determination provided by the New Mexico Department of Workforce Solutions for the present project can be found in an appendix to the Contract Documents.

1.8 TESTING AND INSPECTION ALLOWANCES

- A. Testing Allowance: The bid schedule includes a predetermined sum to cover the cost of testing and inspection services as required in the Contract Documents.
1. Contractor shall submit details regarding the proposed testing laboratory or inspection firm, including a statement of qualifications and a proposed schedule of unit price costs and estimated total cost for testing and inspection to be completed under the allowance. Any additional costs, such as travel time, shall also be detailed for this project on a unit price basis and as part of the estimated total cost of testing and inspection. Engineer may require the Contractor to solicit additional quotes if the proposed costs are not competitive.
 2. Costs Included in Allowance: Cost of engaging testing or inspection firm, execution of tests or inspection, and reporting of results.
 - a. Costs Not Included in Allowance:
 - b. Incidental labor and facilities required to assist testing or inspection firm.
 - c. Cost of disinfection of waterlines, if applicable.
 - d. Costs of hydrostatic pressure testing or testing of material welds as called for in the Contract Documents.
 - e. Costs of failed tests.
 3. Costs will be drawn from testing allowance and paid based on invoice(s) submitted to Contractor by testing or inspection firm(s), and reimbursed at cost, with no markup by Contractor. Contractor shall submit appropriate NTTC form to testing firm to assure tax is not included on invoices.
- B. Electrical Extension Allowance: The bid schedule includes an allowance to cover the cost of an extension of primary power to the Sandoval County Placitas Well Building Site. The costs for such an extension shall be the power company's direct charges for extending power without Contractor markup.
1. The Contractor shall coordinate with the power company to ensure that the electrical service extension does not delay construction.
 2. An equitable adjustment, based on the actual charges without Contractor markup, covering an increase or decrease in the amount established for the Allowance will be made in the payments of the Contract.

1.9 SCHEDULE OF VALUES

- A. Submit schedule of values on the Construction Progress sheet within the Application for Payment forms provided in the Construction Contract Documents Progress Estimate sheet within the Application for Payment forms (EJCDC Form C-620 (2013 Edition), or

on other form acceptable to the Engineer. Contractor's standard form or electronic media printout will be considered.

- B. Base structure of Schedule of Values on Bid Schedule with identical item numbering, quantities, and values.
- C. Submit Schedule of Values in duplicate at least 15 days prior to first Progress Meeting.

1.10 APPLICATIONS FOR PAYMENT

- A. Application for Payment is synonymous with Partial Payment Estimate.
- B. Submit electronic copies of each application on the Partial Payment Estimate form provided in the Contract Documents, together with updated Schedule of Values identifying fully the list of items in the Application for Payment.
- C. The Partial Payment Estimate forms consist of four sections: Cover Sheet, Construction Progress spreadsheet, Materials-On-Hand form, and Monthly Construction Progress Certificate. The purpose of the Monthly Construction Progress Certificate is to provide a complete account of all change orders/claims for the corresponding contract period, and all outstanding change orders/claims from previous contract periods, and waives any rights to further adjustments in contract times or price for any change orders/claims that originated in the current contract period.
- D. Payment Period: Monthly, however the present Contract allows the Owner to make payment within forty-five days after submission of an undisputed request for payment.

1.11 CHANGE PROCEDURES

- A. All Change Orders shall be prepared on the form provided in these Contract Documents.
- B. Unit Price Change Order: For pre-determined unit prices and quantities, Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work not pre-determined, refer to Article 12 - Change of Contract Price; Change of Contract Times, of the Standard General Conditions (EJCDC C-700 Standard General Conditions of the Construction Contract).

1.12 UNIT PRICES

- A. Engineer will take measurements and compute quantities accordingly. The Contractor will assist in taking of measurements and determination of work completed prior to preparation of corresponding Application for Payment.

1.13 ALTERNATES

- A. Additive Bid Alternate 1: Includes the construction of a new concrete foundation and retaining wall for three (3) existing water storage tank, including the piping to the water storage tanks.

- B. Additive Bid Alternate 2: Includes the installation of approximately 880 linear feet (LF) of new 6" fire waterline from the Station 0+00 to Approximately Sta. 8+40, including the installation of a new fire hydrant at the Placitas Library and all valves and appurtenances.

1.14 COORDINATION

- A. Obtain any required business license(s) required by Owner or agency(ies) with jurisdiction prior to commencing construction activities.
- B. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.
- C. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- D. Submit a Traffic Control Plan that is signed and sealed by a Professional Engineer in the state of project location prior to construction activities.
 - 1. All existing signs, markers, delineators, etc. within the construction limits shall be removed, stored, and reset.
 - 2. Subject to the established Traffic Control Plan, at least one lane shall be open to traffic at all times. Provide proper signage to maintain the traffic lane in such a manner as to assure proper safety to the traveling public on all affected roads. Provide access to all private and public property at all times except when grading, excavation and backfill operations are being conducted immediately in front of the property, in which case access will not be denied for more than 4 hours without approval from the Engineer.
 - 3. Traffic lanes provided during construction shall be maintained in such a condition under all weather conditions, so as to permit the reasonable passage of passenger vehicles, and shall be kept graded and smooth and watered several times daily, as needed, to control dust.
- E. The Contractor is responsible for obtaining all applicable local, county and state building and development permits not previously obtained by Engineer or Owner. This includes permits from the Construction Industries Division of the Regulation and Licensing Department of the State of New Mexico, and any other regulatory agency having jurisdiction.
- F. Contractor is responsible for timely scheduling of any pertinent inspections with local, county and state agencies with jurisdiction, and as required by the permits.
- G. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
- H. All notices, demands, requests, instructions, approvals, proposals and claims must be in writing.

1. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement.
2. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the Owner at the address stated on the signature page of the Agreement.
3. Any such notice shall be deemed to have been given as of the time of actual delivery, in the case of mailing, when the same should have been received in due course of post, or in the case of telegrams, certified mail, or telephone facsimiles, at the time of actual receipt as the case may be.

1.15 SUSPENSION OF WORK

- A. The Owner may order suspension of work due to seasonal or other conditions unsuitable for construction work.
- B. Maintenance during suspension: Prior to suspension for any cause, the Contractor shall take necessary precautions to protect the work during the period of suspension from any factors which would contribute to its deterioration.
- C. Time elapsed during suspension of the work shall not count as contract time. The Contractor shall make no claim for damages due to delay, additional mobilization charges, nor any additional costs that may be incurred solely due to suspension of work.
- D. Requests for additional time to be added after the “contract completion date” due to delays or extra work shall be made to the Owner in writing by the Contractor within ten (10) days after the time of the occurrence of the delay or receipt of a Change Order for extra work. Such requests shall set forth the justification for the additional time.
- E. Upon approval, the additional contract time shall then be in full force and effect, the same as though it were the original date for completion, and will be shown as the completion date plus an amount of additional working days. Any time required to complete the work beyond the contract time or additional contract time will result in the assessment of liquidated damages, as specified in the Contract Documents. Failure to make such requests within the above limits will be considered as a waiver on the part of the Contractor as to the need for additional contract time.

1.16 FIELD ENGINEERING

- A. Establish elevations, lines, and levels and certify and confirm elevations and locations of the Work, conforming with the Contract Documents, with the Engineer prior to performing any excavation.
- B. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.
- C. From the information provided by the Owner, the Contractor shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, easement

alignments, stakes for pipe locations and other working points, lines, elevations and cut sheets.

1.17 PRE-CONSTRUCTION CONFERENCE

- A. Engineer will schedule Pre-Construction Conference after Notice of Award for affected parties.
- B. The Contractor, or his duly authorized representative, and subcontractor representatives will attend the meeting.

1.18 PROGRESS MEETINGS

- A. Schedule in coordination with the Engineer at maximum monthly intervals, and attend all Progress Meetings throughout progress of the Work.
- B. The purpose of the meetings will be to review the following:
 - 1. Work progress since previous meetings.
 - 2. Field observations, problems, conflicts.
 - 3. Problems which impede construction schedule.
 - 4. Corrective measures and procedures to regain projected schedule.
 - 5. Revisions to construction schedule.
 - 6. Plan progress and schedule during succeeding work period.
 - 7. Coordination of schedules.
 - 8. Off-site fabrication and delivery schedules.
 - 9. Maintenance of quality standards.
 - 10. Proposed changes, construction schedule and completion date.
 - 11. Coordination of separate contracts.
 - 12. Record or "as-built" drawings of completed work.
 - 13. Other business as required.
 - 14. Regulatory requirements including OSHA, New Mexico Board of Labor, and others as applicable.
 - 15. Funding requirements including RUS, NMED, NMFA, DFA, USEPA and others as applicable.
- C. During each meeting, the Contractor is required to present any issues which may impact his Work, with a plan to resolve these issues expeditiously.
- D. Together with each payment application, Contractor must present the current as-built drawings reflecting all work performed to date.

1.19 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching new Work; restore Work with new Products.
- B. Execute cutting, fitting, and patching, including excavation and fill, to complete Work, and to:
 - 1. Uncover Work to install or correct ill-timed Work.

2. Remove and replace defective and non-conforming Work.
 3. Remove samples of installed Work for testing.
 4. Provide openings in elements of Work for penetration of mechanical and electrical Work.
- C. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.
- D. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- E. Refinish surfaces to match adjacent finishes.

1.20 SUBMITTAL PROCEDURES

- A. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions and elevations, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- C. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of completed Work.
- D. Revise and resubmit submittals as required by the Engineer; identify changes made since previous submittal.
- E. Submit number of copies Contractor requires, plus two copies Engineer will retain, at a minimum, unless otherwise indicated at the Pre-Construction Conference.
- F. Transmit each submittal with Engineer accepted form.
- G. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- H. Prior to commencing construction activities, Contractor shall provide two (2) copies of the corresponding Project safety plan to the Engineer, per SC-7.12.I of EJCDC C-800 Supplementary Conditions.

1.21 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within fifteen [15] days after date of Owner-Contractor Agreement for Engineer review.
- B. Submit revised schedules with each Application for Payment, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.

- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- E. Indicate delivery dates for Owner furnished products and products identified under Allowances.

1.22 PROPOSED PRODUCTS LIST

- A. Unless required as an attachment to Bid, within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.23 PRODUCT DATA

- A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit copies and distribute in accordance with Submittal Procedures article.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.24 SHOP DRAWINGS

- A. Shop Drawings:
 - 1. Submitted to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
 - 2. Include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, list, graphs, catalog sheets, data sheets, and similar items.
 - 3. Design calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is to be built, unless otherwise directed.
 - 4. After review, provide copies and distribute in accordance with Submittal Procedures article and for record documents purposes as specified.

5. Except as may otherwise be indicated herein, the Engineer will return copies of each submittal to the Contractor with comments noted thereon, within 30 calendar days following their receipt by the Engineer.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Submit number of opaque reproductions Contractor requires, plus two copies Engineer will retain.

1.25 TEST REPORTS

- A. Submit for Engineer's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.26 MANUFACTURER'S INSTRUCTIONS AND CERTIFICATES

- A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- C. When specified in individual specifications sections, submit certifications by manufacturer to Engineer, in quantities specified for Product Data.
- D. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- E. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.27 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer's instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.28 TOLERANCES

- A. Monitor fabrication and installation tolerance control of installed products over suppliers, manufacturers, products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply fully with manufacturer's tolerances.

1.29 REFERENCES

- A. Conform to reference standards by date of issue current as of date of Contract Documents.
- B. When specified reference standard conflict with Contract Documents, request clarification from Engineer before proceeding.

1.30 MANUFACTURER'S FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to furnish qualified staff personnel to observe site conditions and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions that are supplemental or contrary to manufacturer's written instructions.

1.31 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify utility services are available, of correct characteristics, and in correct location.
- C. Contractor is solely responsible for utility location, protection and verification. Contractor must notify New Mexico One Call System Inc., at 811, and all local utility providers, three (3) days before starting utility line construction.
- D. It shall be the responsibility of the Contractor to become acquainted with the location of all underground structures which may be encountered or which may affect the Work hereunder.

1.32 TEMPORARY SERVICES

- A. Provide, maintain and pay for suitable quality water service as required.
- B. Maintain uninterrupted water, wastewater, and electric service to all properties adjoining the Work, except where specifically approved by the authority having jurisdiction. Services damaged by the Contractor shall be immediately and permanently repaired or replaced at the expense of the Contractor. Give a minimum of 48-hour advance notice to

occupants of adjacent properties before interrupting any service. Any interruption of service shall be kept to the minimum length of time possible.

- C. Until final inspection and approval of the Work and issuance of the Certificate of Substantial Completion, the Contractor is responsible for all Work directly or indirectly affected by the Contractor's activities. Such responsibility continues for all Work detailed on the punch list that may accompany the Certificate of Substantial Completion, until satisfactorily completed by the Contractor and approved by the Owner and Engineer.
- D. Furnish, install and maintain any temporary water storage structures, electrical connections, meters, wiring, outlets, switches, lamps, etc., as necessary for the work. The Contractor shall provide such temporary heat as may be necessary for the prevention of injury to the work or material through dampness or cold. All temporary connections, installations, facilities and supplies furnished or installed as specified in this paragraph, shall be removed prior to the completion of the Contract, and the premises left perfectly clean and satisfactory to the Owner.
- E. Maintain ambient temperature above freezing in enclosed/occupied areas where construction is in progress, unless indicated otherwise in specifications.
- F. Provide temporary electricity and power outlets for construction operations, connections, branch wiring, distribution boxes, and flexible power cords as required. Do not disrupt Owner's need for continuous service.
- G. Provide and maintain required sanitary facilities and enclosures in clean and sanitary condition.

1.33 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Existing on-site roads, designated by the Owner, may be used for construction traffic.

1.34 PROGRESS CLEANING AND WASTE REMOVAL

- A. Collect and maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- B. Remove waste and surplus materials, rubbish, and construction facilities from site. Restore all job sites and adjoining areas, including roads and driveways, to a condition equal to or better than the original status. Special attention will be made to not disturb unimproved roads by placing any excavated material to the sides of these roads when waterlines are located along the right-of-way.
- C. Brush and trees shall be felled parallel to the right-of-way to minimize damage to trees and structures on adjacent property. All brush, tree tops, stumps and other debris shall be removed from the right-of-way and disposed of by the Contractor, subject to and in

conformity with the special provisions applying to the tract of land involved (if any). The Contractor shall not destroy nor remove any trees, shrubbery, nor any other improvements, without permission of the Owner.

- D. The Contractor shall not dispose of debris, refuse or sanitary wastes in an open dump or in a natural watercourse, whether on public or private property, or in such places that undesirable wastes can eventually be exposed or carried to a natural watercourse.

1.35 PROJECT IDENTIFICATION

- A. No project sign is required.
- B. The Contractor shall not erect, or permit the erection of advertising signs. Only minimal identification and direction signs shall be permitted on the site. Unnecessary or obnoxious posters, pictures, signs, symbols, drawings or writing on work, material or equipment, resulting from vandalism or other causes, shall be covered or removed by the Contractor.

1.36 BARRIERS AND FENCING

- A. Provide barriers or fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.

1.37 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.

1.38 SECURITY

- A. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.39 WATER CONTROL

- A. Provide erosion control.
- B. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. In the event that one acre of earth or more is disturbed, the Contractor shall submit to the Owner's Resident Project Representative a Storm Water Pollution Prevention Plan (SWPPP) that will address all construction phases and the proposed pollution prevention and sediment control measures. This shall be done in accordance with the National Pollution Discharge Elimination System (NPDES) general permit requirements for all construction activities, and shall include all required reporting. If the Bid Form does not include an item for preparation and implementation of the SWPPP, the cost thereof will be considered incidental to related work.

- D. The Contractor shall conduct his operations to minimize damage to natural watercourses, and shall not permit petroleum products, volatile fluid wastes, or any other wastes which are prohibited by local ordinances, or excessive amounts of silt, clay, or mud to enter any drainage system. The bed of natural watercourses or man-made irrigation ditches shall be restored to normal gradient and cross-section after being disturbed.

1.40 POLLUTION AND ENVIRONMENTAL CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Provide dust control, erosion and sediment control, noise control, pest control and rodent control to allow for proper execution of the Work. Short term effects of dust produced by equipment will be mitigated by sprinkling traffic areas with water. Motor equipment shall be kept in repair and equipped with anti-pollution devices, if possible, to cut down on exhaust emissions. Burning as a method of cleaning or disposal will not be permitted without approval of the proper authorities.
- C. Comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act of 1970 (42 U.S.C. 1251 et seq.) as amended. Violations shall be reported to the New Mexico Environment Department.
- D. The Contractor shall be responsible for the reporting and the cleanup of spills associated with project construction and shall report and respond to spills of hazardous materials such as gasoline, diesel, motor oil, solvents, chemicals, toxic and corrosive substances, and other materials which may be a threat to the public health or the environment. The Contractor shall be responsible for reporting past spills encountered during construction and of current spills not associated with construction. Reports shall be made to the New Mexico Environment Department Emergency Response Team at (505) 476-6025 during business hours. If there is no emergency situation the Contractor can leave a message regarding the nature of the spill, location and contact information. For emergencies that require immediate attention and mitigation, and there is no response at the NMED Emergency Response Team number above, call (505) 827-9329. For emergencies that pose immediate danger to public health or property, call 911. For any and all spills, Contractor shall also immediately contact the Owner's Resident Project Representative.
- E. The Contractor shall clean up any unreported spills associated with project construction identified after construction.

1.41 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion review.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.42 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents.
- C. Provide interchangeable components of same manufacturer for components being replaced.

1.43 DELIVERY, HANDLING, STORAGE, AND PROTECTION

- A. Deliver, handle, store, and protect Products in accordance with manufacturer's instructions.

1.44 SUBSTITUTIONS

- A. Substitutions will only be considered when Product becomes unavailable through no fault of Contractor, or where an “approved equal” is specifically allowed elsewhere in the Technical Specifications or noted on the Drawings. In such cases, the brand name and/or model number of products that have been identified in these Specifications serve as the basis of the design. These products may be substituted with other products that meet the same manufacturing standards, quality, performance and desired characteristics of the Specifications when approved by the Engineer or Owner’s representative.
- B. Specific manufacturers may be required for certain items in order to maintain consistency with the Owner’s existing inventory. In such cases, substitutions will not be allowed as indicated in each specification section where applicable.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. Submit three [3] copies of request for Substitution to the Engineer for consideration. Limit each request to one proposed Substitution.

1.45 CLOSEOUT PROCEDURES

- A. Submit written certification Contract Documents have been reviewed, Work has been inspected, and Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Price, previous payments, and amount remaining due.
- C. Among required closeout submittals include: Release of Liens, Consent of Surety, and Certification of Labor Standards.

1.46 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Upon completion of the work under this contract, thoroughly clean and make any needed repairs caused by damage during construction to any existing utilities or other structures on the site.
- C. Notify the Engineer in writing once final cleaning is complete. The final estimate will not be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that it is properly constructed and the site properly cleaned.

1.47 STARTING OF SYSTEMS

- A. Provide seven [7] days notification prior to start-up of each item.
- B. Ensure each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturer's instructions.
- D. Submit written report stating equipment or system has been properly installed and is functioning correctly.

1.48 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six [6] months.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

1.49 TESTING, ADJUSTING, AND BALANCING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Owner retains the right to appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing. Reports will be submitted by independent firm to Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with requirements of Contract Documents.
- C. Contractor will cooperate with independent firm; furnish assistance as requested.

- D. Re-testing required because of non-conformance to specified requirements will be charged to Contractor.

1.50 PROTECTING INSTALLED CONSTRUCTION

- A. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- B. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- C. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- D. Prohibit traffic from landscaped areas.

1.51 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of Contract Documents to be utilized for record documents.
- B. Record actual revisions to the Work. Record information concurrent with construction progress.
- C. Specifications: Legibly mark and record at each Product section description of actual Products installed.
- D. Record Documents and Shop Drawings (As-Built Drawings): Legibly mark each item to record actual construction. Deliver two (2) sets of As-Built Drawings with redlines to the Owner upon completion of the Project. The As-Built Drawings will be submitted to the Engineer prior to processing of final payment to the Contractor.
- E. Contractor shall prepare record drawing information under the direction of a Licensed Professional Surveyor. As-Built Record Drawings shall include elevation at top of pipe, northing and easting of top of pipeline or new utility at intervals not to exceed 100 feet and at all fittings, valves and transitions and other appurtenances as well as finished grade elevations at each location cited above, and at the top of flange or top of nut (specify on drawing point description) of all hydrants. Ties to surface features for triangulation purposes in the field shall also be included. Final As-Built Record Drawings shall be stamped by a Licensed Professional Surveyor, tied to established control monuments and other reference points (including D.O.T. monuments and mile markers if available) on the New Mexico State Plane Coordinate System, Central Zone, NAD83/NAVD88 datum, stating combined ground-to-grid scale factor used, equipment used and date of completion of survey.
- F. Submit documents to Engineer together with claim for final Application for Payment.

1.52 OPERATION AND MAINTENANCE DATA

- A. Submit 3 sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.
- C. Internally subdivide binder contents with permanent page dividers, logically organized.
- D. Contents:
 - 1. Part 1: Directory
 - a. List names, addresses, and telephone numbers of Engineer, Contractor, subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system:
 - a. Equipment summary, operational procedures, preventive maintenance procedures and schedules, parts list, shop drawings, safety issues.
 - 3. Part 3: Project documents and certificates.
 - a. All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.

1.53 SPARE PARTS AND MAINTENANCE MATERIALS

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

1.54 WARRANTIES AND PRODUCT REGISTRATION

- A. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers for all products with extended warranties beyond one (1) year.
- B. Execute and assemble product registration documents from suppliers and manufacturers, on Owner's behalf, for all products requiring such registration, for recall or warranty purposes.
- C. Submit prior to final Application for Payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 03 05 00

BASIC CONCRETE MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes formwork, reinforcement, accessories, cast-in-place concrete, transporting, placing, finishing, curing, and other pertinent items of construction.
- B. Concrete and Standards - Except as noted or modified in this section, all concrete materials, transporting, placing, finishing, curing, and sealing shall conform to requirements as follows:
 - 1. American Institute of Concrete (ACI)
 - a. 301 - Specifications for Structural Concrete.
 - b. 302.1R - Guide to Concrete Floor and Slab Construction.
 - c. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - d. 305.1 - Specification for Hot Weather Concreting.
 - e. 306.1 - Standard Specification for Cold Weather Concreting.
 - f. 308.1 - Standard Specification for Curing Concrete.
 - g. 318 - Building Code Requirements for Structural Concrete.
 - h. 347R - Guide to Formwork for Concrete.
 - i. SP-66 - ACI Detailing Manual.
 - 2. ASTM International (ASTM)
 - a. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - b. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - c. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - d. ASTM C33 - Specifications for Concrete Aggregates.
 - e. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - f. ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
 - g. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - h. ASTM C94 - Specification for Ready-Mixed Concrete.
 - i. ASTM C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - j. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - k. ASTM C150 - Standard Specification for Portland Cement.
 - l. ASTM C156 - Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete.
 - m. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.

- n. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - o. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - p. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - q. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
 - r. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - s. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
 - t. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
 - u. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
 - v. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - w. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
 - x. ASTM C1550 - Standard Test Method for Flexural Toughness of Fiber Reinforced Concrete (Using Centrally Loaded Round Panel).
 - y. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
 - z. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
 - aa. ASTM C1609 - Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).
 - bb. ASTM C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete.
3. American Association of State Highway & Transportation Officials (AASHTO):
- a. PP 65 - Standard Practice for Determining the Reactivity of Concrete Aggregates and Selecting Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction.

1.2 QUALITY ASSURANCE

- A. Inform Engineer at least 48 hours in advance of time at which Contractor intends to place concrete.
- B. When required by any applicable permits, such as CID permits, Contractor shall have reinforcement inspected by the agency with jurisdiction prior to placement of concrete.
- C. Construct and erect concrete formwork in accordance with ACI 301 and ACI 347R.
- D. Concrete tests shall be in accordance with requirements of ACI 301, except as noted or modified in this Section.
 - 1. Strength test:
 - a. Mold and cure 5 cylinders from each sample.

- b. Test one at 7 days and one at 14 days for information and two at 28 days for acceptance (three at 28 days if using 4x8 inch cylinders).
- E. Samples:
1. Collect the following minimum samples for each 28-day strength concrete used in the work for each days placing:
 2. Coordinate the following table with Article 3.8 of this specification. ACI 301 and 318 require sampling every 150 CY or every 5000 SQ.FT. of surface area for slabs and walls. Adjust the sampling requirement to project specific situation/scope.
 3.

<u>Quantity</u>	<u>Number of Samples</u>
50 cubic yards or less	1
50 to 100 cubic yards	2
100 cubic yards or more	2 plus 1 sample for each additional 100 cubic yards
 4. Sampling should be in accordance with ASTM C172.
 5. Forming cylinders in accordance with ASTM C31.
 6. No sample shall be required for thrust blocks nor fence posts.
 7. Hold fifth cylinder for future considerations. Deliver to Owner upon determination of substantial completion and prior to final payment.
 8. Sample marking.
 - a. Mark or tag each sample of compression test cylinders with date and time of day cylinders were made.
 9.
 - a. Identify location in work where concrete represented by cylinders was placed.
 - b. Identify delivery truck or batch number, air content and slump.
 10. Slump test:
 - a. Conduct test for each strength test sample and whenever consistency of concrete appears to vary, in accordance with ASTM C143.
 11. Air content:
 - a. Conduct test from 1 of first 3 batches mixed each day and for each strength test sample, in accordance with ASTM C231, 138 or 173.
 12. Temperature:
 - a. Conduct test in accordance with ASTM C1064.
- F. Coordinate concrete placement with the Engineer to ensure proper testing in compliance with the Drawings and Specifications. The cost of all tests shall be covered by the Testing Allowance provided for in the bid schedule, except for failed tests, or new analyses required due to failed tests.
- G. The Contractor is free to take additional specimens for his own information, at his own expense, not reimbursable from the Testing Allowance.
- H. Acceptance of Concrete: Strength level of concrete will be considered satisfactory so long as average of all sets of 3 consecutive strength test results equal or exceeds specified 28-day strength and no individual strength test result falls below specified strength (f_c') by

more than 500 psi when specified compressive strength is 5000 psi or less; or by more than **0.10 f_c'** when specified compressive strength is more than 5000 psi.

- I. Failure of Test Cylinder Results: Upon failure of test cylinder results, Engineer may require Contractor, at his expense, to test remaining cylinder after curing for a period of time specified by Engineer. If strength level of this cylinder is not greater than specified 28-day strength, Engineer may require Contractor to obtain and test at least three 2-inch diameter cored samples from an area in question.
 - 1. Conform to ASTM C42.
 - 2. Concrete will be considered adequate if average of 3 cores is at least 85 percent of, and if no single core is less than 75 percent of, specified 28-day strength.
 - 3. Upon failure of core test results, Engineer may require Contractor, at his expense, to perform load tests as specified in ACI 318.
 - 4. Fill all core holes as specified for repairing defective concrete.

- J. Completed Work
 - 1. Completed concrete work which fails to meet 1 or more requirements, but which has been repaired to bring it into compliance, will be accepted without qualification.
 - 2. Completed concrete work which fails to meet 1 or more requirements and which cannot be brought into compliance shall be rejected as provided in these Contract Documents. In this event, modifications shall be required to assure that concrete work complies with requirements. Modifications, as directed by Engineer, to be made at no additional cost to Owner.

- K. Perform concrete reinforcing and cast-in-place concrete work in accordance with ACI 301.

- L. The maximum deviation of the top surface of curb and gutter shall not exceed 1/8" in 10' nor shall the inside face deviate more than 1/4" in 10' from a straight line. Prior to or during final inspection, curb and gutter shall be water flow tested as directed by the Engineer. All areas with standing water will be rejected.

PART 2 PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

- A. Steel Forms: Symons "Steel-Ply", Simplex "Industrial Steel Frame Forms", Universal "Uniform". Forms shall be clean, straight and true, without surface defects.

- B. Plywood Forms: Product standard PS-1, waterproof, resin-bonded exterior type Douglas Fir or Larch. Forms shall be clean, straight and true, without surface defects.

- C. Lumber: Douglas Fir or Larch, straight, uniform width and thickness, clean and free from offsets, holes, dents and other surface defects.

- D. Chamfer Strips: Clean white pine, surface against concrete planed.

- E. Form Release Agent: Colorless mineral oil not capable of staining concrete or impairing natural bonding characteristics of coating intended for use on concrete.

2.2 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615, deformed. Reinforcement bar, size and spacing as indicated on the Drawings.
- B. Welded wire fabric reinforcement shall conform to the requirements of ASTM A1064 and the details shown; provided, that welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded wire fabric with longitudinal wires larger than W4 size shall be furnished in flat sheets only.
- C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing; plastic tipped or non-corroding for supports in slabs where supports are exposed to weather.
- D. Concrete blocks used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.
- E. Fabricate concrete reinforcing in accordance with ACI SP-66.

2.3 CONCRETE MATERIALS

- A. Cementitious Materials:
 - 1. Portland Cement: ASTM C150 Type I.
 - 2. Fly Ash: ASTM C618, Class F or C.
 - 3. Slag Cement: ASTM C989, Grade 100 or 120.
 - 4. Silica Fume: ASTM C1240.
 - 5. Metakaolin: ASTM C618, Class N.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: ASTM C1602/C1602M, Clean and not detrimental to concrete.
- D. Chemical Admixtures (when applicable): Compatible with each other and free of intentionally-added chlorides.
 - 1. Air Entraining Admixture: ASTM C260.
 - 2. Water-Reducing Admixture: ASTM C494, Type A.
 - 3. Mid-Range Water-Reducing Admixture: ASTM C494, Type A.
 - 4. High-Range Water-Reducing Admixture: ASTM C494, Type F.
 - 5. Accelerating Admixture: ASTM C494, Type C or E.
 - 6. Retarding Admixture: ASTM C494, Type B or D.
 - 7. Workability-Retaining Admixture: ASTM C 494, Type S.
 - a. Shall retain concrete workability without affecting time of setting or early-age strength development.
 - 8. Alkali-Silica Reaction Inhibiting Admixture: ASTM C494, Type S
 - a. Shall contain a nominal lithium nitrate content of 30 percent.

2.4 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Re-tempering of prepared concrete will not be permitted.
- C. Furnish concrete of the following strength:

Type of Work	Min. 28-Day Compressive Strength (psi)	Max. Size Aggregate (in.)	Min. Cement W/C per CY (94# sacks)	Maximum w/cm (by wt.)
Slabs on grade, footings floor slabs, and all other concrete items not specified elsewhere.	4,000	1	6.0	0.50
Site work concrete such as fence posts, thrust blocks, valve collars, etc.	3,000	1	5.0	0.50

- D. Proportioning:
 - 1. Proportion ingredients to produce a well-graded mix of high-density maximum workability consistent with approved mix design.
 - 2. Entrained air - all concrete exposed to freeze-thaw cycles under saturated conditions:
 - a. Five (5) percent, plus or minus one (1) percent, for concrete in the forms. Concrete samples for air content tests shall be taken at the end of the concrete truck chute or the output of the concrete pump, whichever applies. A reduction in air content of pumped concrete should be expected. Contractor shall be responsible to coordinate with the concrete supplier to provide the specified air content of the in-place concrete.
 - b. Refer to ACI 301 for further requirements.
 - 3. Fly ash, silica fume, and slag cement:
 - a. Fly ash: The mineral admixture Class F fly ash shall be proportioned by weight of cement to provide a fly ash to portland cement ratio not less than 1:4 and not less than 25 per cent of the total cementitious material. Portland cement concrete submitted under this specification shall be proportioned with Class F fly ash, unless a variance is authorized by the Engineer. Alternatively, lithium-based admixture can be used in lieu of Class F fly ash to mitigate ASR. The Contractor shall provide the Engineer with chemical and physical analysis of the fly ash.
 - b. Silica fume: Silica fume may be added to the mix and shall be proportioned by weight of cement to provide a silica fume to Portland cement ratio not less than 1:25 and no greater than 1:7. Portland cement concrete using silica fume shall follow ASTM C1240 standards.
 - c. Slag cement: Slag cement may be added to the mix and shall be proportioned by weight of cement to provide a slag cement to Portland cement ratio of no greater than 80 percent. Slag cement can consist of

Grade 100 or grade 120. Portland cement concrete using slag cement shall follow ASTM C989 standards.

4. Aggregates supplied under this Specification shall be assumed to be "alkali-silica reactive", ASR. Mitigation measures, such as the use of supplementary cementitious materials or lithium nitrate based admixtures or the combination of both, shall be utilized in the concrete mixtures to mitigate alkali-silica reaction, when the aggregates are known to be alkali-silica reactive. Replacement levels of supplementary cementitious materials and the dosage of lithium nitrate based admixtures shall be determined in accordance with the performance-based approach provided in ASTM C1778. Variance from this position for a particular aggregate source may be authorized by the Engineer. Application for a variance may be made to the Engineer.
 - a. Portland cement concrete design mixes using non alkali-silica reactive aggregates will not be required to be proportioned with Class F fly ash.

E. Batching and Mixing Equipment: Conform to ACI 304R.

F. Slump:

1. Keep as low as possible consistent with proper handling and thorough compaction.
2. Shall not exceed 4 inches unless otherwise authorized by Engineer.

2.5 CEMENT GROUT

A. Portland Cement: ASTM C150, Type I and II.

B. Water:

1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts.

C. Fine Aggregate:

1. Washed natural sand.
2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
3. Free from injurious amounts of organic impurities as determined by ASTM C40.

D. Mix:

1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.
2. Water content shall be such that the grout can be readily spread, yet not wet enough to cause trouble with surface water or laitance, or failure to stay in place after screeding. All grout mixes and mixing procedures shall be submitted in accordance with submittal requirements, and shall be subject to review and approval by the Engineer prior to commencing the grouting operations.

E. The minimum compressive strength at 28 days shall be 4000 psi.

F. Procedures for Grout placement shall be approved by the equipment supplier, to insure that no equipment is overstressed, as well as proper placement tolerances. Equipment Supplier shall have final say on grouting procedures and final tolerances.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

- A. Erect formwork, shoring and bracing to achieve design requirements.
- B. Erect forms substantially and sufficiently tight to prevent leakage of mortar and braced or tied to maintain desired position, shape and alignment before, during, and after concrete placement.
- C. Carefully remove forms only after concrete is able to support all dead and live loads and curing requirements are met. Apply curing compound to all formed surfaces immediately after form removal.
- D. Camber slabs and framing to achieve ACI 301 tolerances.
- E. Provide bracing to ensure stability of formwork.
- F. Clean forms as erection proceeds, to remove foreign matter.

3.2 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

- A. Provide formed openings where required for work to be embedded in and passing through concrete members.
- B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install concrete accessories straight, level, and plumb.
- D. Install water stops continuous without displacing reinforcement.

3.3 REINFORCEMENT PLACEMENT

- A. Place reinforcement, supported and secured against displacement.
- B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

3.4 PLACING CONCRETE

- A. Do not place concrete during rain, sleet, or snow unless adequate protection is provided and Construction Observer approval is obtained. Do not allow rainwater to increase mixing water or damage surface finish.
- B. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.

- C. Convey concrete from mixer to final position as rapidly as practicable without segregation or loss of material. Limit chute length to less than 20 feet with maximum slope of 1 vertical to 2 horizontal.
- D. Maximum height of concrete free fall is 4 feet.
- E. Place concrete continuously between predetermined expansion, control and construction joints. Do not break or interrupt successive pours creating cold joints.
- F. On large volume pours, concrete shall be placed with the aid of approved mechanical vibrators. Vibration shall be supplemented by manual forking or spading adjacent to the forms on exposed faces in order to secure smooth dense surfaces. The concrete shall be thoroughly consolidated around reinforcement, pipes or other shapes built into the work.
- G. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrink grout.
- H. Screed slabs-on-grade and concrete base for toppings level.

3.5 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Remove formwork progressively and in accordance with code requirements.

3.6 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R.
- B. Uniformly spread, screed, and float concrete.
- C. In areas with floor drains, maintain floor level at walls and slope surfaces uniformly to drains.
- D. Provide surface conforming to proper elevation and contour with all aggregates completely embedded in mortar by screening.
- E. Provide an initial float as soon as concrete has stiffened sufficiently for proper working.
- F. Provide a second floating at time of initial set.
- G. Apply a broom finish.

3.7 CURING

- A. Immediately after placement, protect concrete from premature drying.

- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete, for not less than ten (10) days in warm to hot weather (per ACI 305.1), and fourteen (14) days in cold weather (per ACI 306.1) after placing, unless otherwise indicated by the Engineer, in accordance with the methods specified herein for the different parts of the Work.
- C. Cold weather is defined in ACI 308.1 as “a period when the average daily ambient temperature is below 40°F for more than three successive days. (Note: The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50°F occur during more than half of any 24-hour duration, the period shall no longer be regarded as cold weather.)”.
 - 1. Cold weather is defined as when the temperature reaches or goes below 35 degrees F for one (1) hour during any 24-hour period during the curing period.
- D. Use a pre-approved concrete curing method. Acceptable curing methods, as detailed in ACI 308.1, are as follows:
 - 1. Water Curing Methods:
 - a. Ponding/Immersion.
 - b. Fogging/Sprinkler.
 - c. Burlap/Cotton Mats/Absorbent Material.
 - d. Wet Sand Curing.
 - e. Straw/Hay.
 - f. Plastic Film.
 - g. Reinforced Paper.
 - 2. Liquid Membrane-Forming Compounds.
- E. The covering used, if applicable, must be overlapped adequately to ensure 100% coverage, and must not be allowed to become dry at any point during the curing period. Place and anchor covers, mats, and/or sheeting to ensure continuous contact with the concrete surfaces.
- F. When using one of the water curing methods, keep the concrete structures thoroughly and continuously moist and covered during the entire curing period.

3.8 FIELD QUALITY CONTROL

- A. Three (3) Concrete Test Cylinders: Taken for every 50 or less cubic yards of each class of concrete placed per section 1.2 E.
- B. One (1) Additional Test Cylinder: Taken during cold weather concreting, and cured on job site under same conditions as concrete incorporated into the Work.
- C. One (1) Slump Test: Taken for each set of test cylinders taken and whenever consistency of concrete appears to vary.
- D. One (1) Air Content Test: Taken for each set of test cylinders taken.
- E. One (1) Concrete Temperature Measurement: Taken for each set of test cylinders taken.

- F. One (1) Ambient Air Temperature Measurement: Taken for each set of test cylinders taken and at the beginning of each day that concrete is being placed.

3.9 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by Engineer.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish all materials for concrete formwork, bracing, shoring and supports and shall design and construct all forms, bracing, shoring and falsework, all in accordance with the requirements of the Contract Documents.
- B. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form accessories.
 - 4. Form stripping.
- C. Related Sections:
 - 1. Section 03 20 00 - Concrete Reinforcement.
 - 2. Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. International Building Code (IBC), as referenced herein, shall be the most recent New Mexico Construction Industries Division (CID) adopted edition
- B. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- C. Government Standards:
 - 1. PS 1-74 U.S. Product Standard for Concrete Forms, Class I.
- D. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- E. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- F. American Society of Mechanical Engineers:
 - 1. ASME A17.1 - Safety Code for Elevators and Escalators.

- G. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. List of form materials and locations of use.
 - 2. Form release agent with EPA Certification.

1.4 QUALITY ASSURANCE

- A. Tolerances: The variation from established lines and grades shall not exceed 1/4-inch in ten (10) feet and there shall be no offsets or visible waviness in the finished surface. All other tolerances shall be within the "Suggested Tolerances" specified in Section 3.3 and 3.4 of ACI 347.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Except as otherwise expressly accepted by the Engineer, all lumber brought on the job site for use as forms, shoring or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:
 - 1. Walls: Steel or plywood panel
 - 2. Columns: Steel, plywood or fiberglass
 - 3. Roof and Floor Slabs: Plywood
 - 4. All Other Work: Steel panels, plywood or tongue and groove lumber

2.2 FORM TIES

- A. Form ties with Integral water stops shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete.
 - 1. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-inch and all such fasteners shall be such as to leave holes of regular shape for reaming.
 - 2. Form ties for water-retaining structures shall have integral water stops. Removable taper ties may be used when approved by the Engineer. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

2.3 FORM AND FALSEWORK MATERIALS

- A. Materials for concrete forms, formwork and falsework shall conform to the following requirements:
 - 1. Lumber shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS10.
 - 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements for PS 1 for Concrete Forms, Class I, and shall be edge sealed.
 - 3. Form materials shall be metal, wood, plywood or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade shown. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.
- B. Unless otherwise shown, exterior corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
- C. Forms and falsework to support roof and floor slabs shall be designed for the total dead load, plus a live load of 40 psf (minimum).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 GENERAL

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms. Forms which are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced at the Contractor's expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework and shoring shall comply with applicable Local, State and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

- B. Concrete forms shall conform to the shape, lines and dimensions of structural components as called for on the Drawings and shall be free from surface defects and sufficiently tight to prevent leakage.

3.3 FORM DESIGN

- A. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.
- B. Suitable and effective means shall be provided on all forms for holding adjacent edges and end of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets or similar surface defects in the finished concrete.
- C. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The form joints shall be tight so as to prevent the loss of water, cement and fines during the placing and vibrating of the concrete. The bottom of the wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Adequate cleanout holes shall be provided at the bottom of each lift of forms.

3.4 INSTALLATION

- A. Formwork - General:
 - 1. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 2. All vertical surfaces of concrete members shall be formed.
 - 3. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 4. Complete wedging and bracing before placing concrete.
- B. Forms for Smooth Finish Concrete:
 - 1. Use steel, plywood or lined board forms.
 - 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 - 3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 - 4. Use full size sheets of form lines and plywood wherever possible.
 - 5. Tape joints to prevent protrusions in concrete.
 - 6. Use care in forming and stripping wood forms to protect corners and edges.
 - 7. Level and continue horizontal joints.
 - 8. Keep wood forms wet until stripped.
- C. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.

- D. Framing, Studding and Bracing:
 - 1. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 2. Distribute bracing loads over base area on which bracing is erected.
 - 3. When placed on ground, protect against undermining, settlement or accidental impact.
- E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- F. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- G. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.
- H. Install fillet and chamfer strips on external corners of beams, joists, and/or columns, as called for on the Drawings.
- I. Install void forms in accordance with manufacturer's recommendations.

3.5 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.6 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- D. Install water stops continuous without displacing reinforcement.

- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- G. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Leave inner rods in concrete when forms are stripped.
 - 3. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
 - 4. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified for "Finish of Concrete Surfaces" in Section 03 30 00 - Cast-In-Place Concrete.
 - 5. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete form stripping or tie removal will not be permitted.
 - 6. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.
- H. Removable Ties:
 - 1. Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond.
 - 2. A precast neoprene or polyurethane taped plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink grout for above-grade walls that are dry on both sides.
 - 3. Exposed faces of walls shall have the outer 2-inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
 - 1. Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer.
 - 2. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 - 3. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.

4. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 5. Arrange joints in continuous line straight, true and sharp.
- K. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
 2. Do not embed wood or uncoated aluminum in concrete.
 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 2. Coordinate work to avoid cutting and patching of concrete after placement.
 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- M. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 2. Slope slabs to drain where required or as shown on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- N. Scream Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
 2. Staking through membrane is not permitted.
- O. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.7 MAINTENANCE OF FORMS

- A. Forms shall be maintained at all times in good condition, particularly as to cleanliness, strength, rigidity, tightness and smoothness of surface. After forms have been removed from a concrete placement they shall be immediately and thoroughly cleaned and repaired and surface treated before reuse.

- B. The form surfaces shall be treated with a non-staining mineral oil or other lubricant acceptable to the Engineer. Any excess lubricant shall be satisfactorily removed before placing the concrete. Oil shall be kept off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.8 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. For roof slabs and aboveground floor slabs, forms shall remain in place until test cylinders attain a minimum compressive strength of seventy-five percent (75%) of the 28-day strength specified in Section 03 30 00 - Cast-In-Place Concrete.
- C. No forms shall be disturbed or removed under an individual panel or unit before the concrete in the adjacent panel or unit has attained seventy-five percent (75%) of the specified 28-day strength and has been in place for a minimum of seven (7) days. Forms for all vertical walls and columns shall remain in place at least forty-eight (48) hours after the concrete has been placed, except for periods of cold weather when forms shall remain in place at least seventy-two (72) hours after concrete has been placed.
- D. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- E. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- F. Leave forms in place for minimum number of days as specified in ACI 347.

3.9 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces that are permanently exposed to view.

3.10 FALSEWORK

- A. The Contractor shall be responsible for the design, engineering, construction, maintenance and safety of all falsework, including staging, walkways, forms, ladders and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements specified herein.
- B. All falsework shall be designed and constructed to provide the necessary rigidity and to support the required dead load plus a minimum of 40 psf live load. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time. Falsework shall be placed upon a solid footing, safe against undermining and protected from softening. When falsework is

supported on any portion of the structure that is already constructed, the load imposed by the falsework shall be spread, distributed and braced in such a way as to avoid any possibility of damage to the structure. Falsework supported off finished floor slabs shall be set in such a way to protect the finish floor surface from being scarred, chipped or gouged.

3.11 FIELD QUALITY CONTROL

- A. Section 03 05 00 – Basic Concrete Materials and Methods.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish, fabricate and place all concrete and masonry reinforcement steel, including all the tie wires, clips, supports, chairs, spacers and other accessories, all as shown and specified in the Contract Documents.
- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forms and Accessories.
 - 2. Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. Codes:
 - 1. The International Building Code, as referenced herein, shall be the most recent New Mexico Construction Industries Division (CID) adopted edition of International Building Code (IBC).
- B. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI SP-66 - ACI Detailing Manual.
- C. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 3. ASTM A185 - Specification for Welded Steel Wire Fabric (Latest Edition) for Concrete Reinforcement.
 - 4. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - 5. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 7. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
 - 8. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
 - 9. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.

- D. American Welding Society:
 - 1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- E. Concrete Reinforcing Steel Institute:
 - 1. CRSI - Manual of Standard Practice (Latest Edition).
 - 2. CRSI - Placing Reinforcing Bars (Latest Edition).
- F. Wire Reinforcement Institute:
 - 1. Manual of Standard Practice for Welded Wire Fabric.

1.3 SUBMITTALS

- A. The Contractor shall furnish to the Engineer reinforcing steel placing drawings. These drawings shall show the number, grade, size, length, mark, location and bending diagrams for all reinforcing steel and related products, together with lists of bent and straight bars in accordance with the ACI Detailing Manual (latest edition) of the American Concrete Institute and the requirements specified herein and shown on the Contract Drawings. The Engineer may or may not review the placement drawings. Any review of the placement drawings by the Engineer will be limited to general compliance with the Contract Documents and will not be returned to the Contractor. Reinforcing steel placement will be checked in the field using the design drawings. Any discrepancies, errors or omissions from the requirements of the Contract Documents shall be corrected prior to placement of concrete and at the sole expense of the Contractor.

1.4 QUALITY ASSURANCE

- A. When required by any applicable permits, such as but not limited to CID permits, Contractor shall have reinforcement inspected by the agency with jurisdiction prior to placement of concrete.
- B. If requested by the Engineer, the Contractor shall provide a certified copy of the mill test report showing physical and chemical analysis for each heat of reinforcement steel delivered.

PART 2 PRODUCTS

2.1 REINFORCEMENT STEEL

- A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:
 - 1. Bar reinforcement shall conform to the requirements of ASTM A615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, or as otherwise shown.
 - 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185 and the details shown. Welded wire fabric with longitudinal wire equal to or less than 4.0 size wire shall be either furnished in flat sheets or in rolls with a core diameter or not less than 10-inches. Welded wire fabric with longitudinal wires larger than 4.0 size shall be furnished in flat sheets only.

3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A82.
- B. Accessories:
1. The Contractor shall furnish and install all accessories including necessary chairs or bolsters, tie wires, supports, spacers and other devices to position reinforcement during concrete placement, all of which must be approved by the Engineer prior to installation.
 2. Wire sizes and geometric dimensions shall be made in accordance with Table II of the latest edition of CRSI Manual of Standard Practice.
 3. Concrete blocks (dobies), used to support and position reinforcement steel, are not allowed.
 4. The wire tie shall be 16-gauge or heavier, black annealed.

2.2 MECHANICAL COUPLERS

- A. Mechanical couplers shall be provided where shown and where approved by the Engineer. The couplers shall develop a tensile strength that exceeds one hundred fifty percent (150%) of the yield strength of the reinforcement bars being spliced at each splice.

PART 3 EXECUTION

3.1 GENERAL

- A. All reinforcement steel, welded wire fabric, couplers and other appurtenances shall be fabricated and placed in accordance with the requirements of the Contract Documents, including referenced specifications, codes and standards.

3.2 FABRICATION

- A. Reinforcement steel shall be accurately fabricated to the dimensions and shape shown in the Contract Documents. Fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings. Bends shall conform to bend dimensions defined as standard in accordance with details in the ACI Detailing Manual and/or CRSI Manual of Standard Practice, unless otherwise shown. Bars shall be bent cold and shall not be bent or straightened in a manner that will injure the material. All hooks shall conform to bend dimensions defined as ACI Standard Hooks.
- B. The Contractor shall fabricate reinforcement bars within the tolerances shown in the ACI Detailing Manual and/or CRSI Manual of Standard Practice.
- C. Reinforcing bars delivered to the field shall be tagged with durable material and marked in a legible manner with waterproof markings. Tags shall show the grade, number of pieces, size and mark or length of bars.

3.3 PLACING

- A. Reinforcing steel shall be accurately positioned as shown on the Contract Documents and shall be adequately supported and wired together to prevent displacement. All reinforcement steel shall be supported or spaced off the forms by metal supports which are rigid enough to prevent any displacement of the reinforcement steel. Concrete blocks (or dobies) shall not be used.
- B. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- C. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at its own expense.
- D. Placing Tolerances: Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 or ACI 318, except where in conflict with the requirements of Building Code.
- E. Bars may need to be moved to avoid interference with other reinforcement steel, conduits or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer. Additional bars may be necessary to prevent cracking or provide additional reinforcement in this case and shall be provided by the Contractor at its own expense.
- F. Welded wire fabric placed over the ground shall be supported on steel chairs spaced not more than three (3) feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.4 SPACING OF BARS

- A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than 1-inch.
- B. Where reinforcement in beams or girders is placed in two (2) or more layers, the clear distance between layers shall be not less than 1-inch.
- C. In columns, the clear distance between longitudinal bars shall not be less than 1-1/2 times the bar diameter, more less than 1-1/2 times the maximum size of the coarse aggregate, more less than 1-1/2 inches.

3.5 SPLICING

- A. General: Reinforcement bar splices shall only be used at locations shown, unless otherwise acceptable to the Engineer.

- B. Splices of Reinforcement: The length of lap for reinforcement bars, unless otherwise shown shall be in accordance with ACI 318, Section 12.15.1 for a class C splice.
- C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each two (2) running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent, except as specifically permitted by the Engineer.

3.6 CLEANING AND PROTECTION

- A. Reinforcing steel delivered to the jobsite shall be suitably stored off the ground and protected from oils, mud, concrete splatter and all conditions conducive to corrosion until embedded in concrete.
- B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be reinspected and, if necessary, recleaned.

PART 4 MEASUREMENT AND PAYMENT

4.1 The work covered in this section for each item shall be considered incidental to the cost of their respective bid items.

END OF SECTION

SECTION 03 29 00

JOINTS IN CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall construct all construction joints, expansion joints and control joints in concrete at the locations shown and formed in accordance with the details shown in the drawings.
- B. Waterstops shall be provided in all construction and expansion joints of hydraulic or below grade structures unless specifically noted otherwise on the drawings.
- C. Related Sections:
 - 1. Section 03 10 00 - Concrete Forms and Accessories.
 - 2. Section 03 20 00 - Concrete Reinforcement.
 - 3. Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. Federal Specifications:
 - 1. TSS-S-00227E(3) Sealing Compound, elastomeric type, multi-component (for Caulking, Sealing, Glazing Buildings and Other Structures)
- B. Commercial Standards:
 - 1. ASTM C 920-86 Specification for Elastomeric Joint Sealants
 - 2. ASTM D 624-81 Test Method for Rubber Property - Tear Resistance
 - 3. ASTM D 1752-84 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.3 CONTRACTOR SUBMITTALS

- A. Waterstop: Prior to production of the waterstop material required under this Contract, the Contractor shall submit for review complete product data, including qualification samples of extruded sections of each size and shape to be used. The submittal shall also include the manufacturer's certification that the water stop material meets the physical requirements as outlined under paragraph 2.01, herein.

1.4 QUALITY ASSURANCE

- A. Waterstop Inspection: Waterstop installation shall be subject to rigid inspection. No waterstop shall be cast in concrete without the Engineer's inspection. Not less than twenty-four (24) hours notice shall be provided to the Engineer for scheduling such inspections.

- B. Waterstop Field Samples: Prior to use of the waterstop material in the field, a sample of a fabricated mitered cross and a tee constructed of each size or shape of material to be used shall be submitted to the Engineer for review. These samples shall be fabricated so that the material and workmanship represent in all respects the fittings to be furnished under this Contract. Field samples of fabricated fittings (crosses, tees, etc.) may be selected at random by the Engineer for testing by a laboratory at the Owner's expense. When tested, they shall have a tensile strength across the joints equal to at least 600 psi.
- C. All field joints in waterstops shall be subject to rigid inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets and other defects. All defective joints shall be replaced and all weathered, damaged or otherwise faulty material shall be removed from the site and disposed of by the Contractor at its own expense.
- D. Waterstops shall be stored on site where it will not be subjected to freezing temperatures or exposed to the direct rays of the sun.
- E. Construction Joint Sealant: The Contractor shall prepare adhesion and cohesion test specimens as specified herein from each shipment of material received at the jobsite. Sealant shall be stored at room temperature and shall not be stored longer than seventy-five percent (75%) of the manufacturer's stated shelf life.
- F. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure:
 - 1. Sealant specimen shall be prepared between two concrete blocks (1-inch by 2-inch by 3-inch). Spacing between the blocks shall be 1/2-inch. Coated spacers (2-inch by 1-1/2 inch by 1/2-inch) shall be used to ensure sealant cross-sections of 1/2-inch by 2-inches with a width of 1/2-inch.
 - 2. Sealant shall be cast and cured according to manufacturer's recommendations except that curing period shall not exceed twenty-four (24) hours.
 - 3. Following curing period, the gap between blocks shall be widened to 1-inch. Spacers shall be used to maintain this gap for twenty-four (24) hours prior to inspection for failure.

1.5 GUARANTEE

- A. The Contractor shall provide a three (3) year written guarantee of the entire joint sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that it agrees to repair or replace, to the satisfaction of the Owner, at no additional cost to the Owner, any such defective areas which become evident within said three (3) year guarantee period.

PART 2 PRODUCTS

2.1 PVC WATERSTOPS

- A. General: Waterstops shall be extruded from an elastomeric plastic compound consisting of virgin polyvinylchloride and additional plasticizers and stabilizers necessary to meet or exceed the requirements and performance criteria of these Specifications and the Corps of

Engineers Specifications CRD-C572. No reclaimed scrap or reprocessed material shall be used.

- B. Flatstrip, Center-Bulb and Multi-Rib Waterstops: Flatstrip, center-bulb and multi-rip waterstops shall be detailed and as manufactured by: Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; or approved equal; provided, that at no place shall the thickness of flat strip waterstops, including the center-bulb type, be less than 3/8-inch. Prefabricated joint fittings shall be used at all intersections of the ribbed-type waterstops.
- C. Physical Properties: When tested in accordance with the specified test standards, the waterstop material shall meet or exceed the following requirements:

<u>Physical Property, Sheet Material</u>	<u>Value</u>	<u>ASTM Test Method</u>
Tensile Strength-Min (psi)	1750	D 638
Ultimate Elongation-Min (percent)	350	D 638
Low Temp. Brittleness-Max (-35 Deg F)	Pass	D 746
Stiffness in Flexure-Min (psi)	400	D 747
<u>Accelerated Aging (CRD-C572)</u>		
Tensile Strength-Min (psi)	1500	D 638
Ultimate Elongation-Min (percent)	300	D 638

2.2 HYDROPHILIC WATERSTOPS

- A. General: Hydrophilic waterstops may be substituted for PVC waterstops. Hydrophilic waterstops may not contain bentonite.
- B. Hydrophilic waterstops shall be manufactured by: Asadi Denka Kogyo K.K. distributed by Mitsubishi International Corp; SYNKO-FLEX Products, Huston Texas; Sika Corporation, Santa Fe Springs, CA. Hydrophilic waterstops shall be install according to the manufacturer’s recommendations.
- C. Physical Properties: When tested in accordance with the specified test standards, the waterstop material shall meet or exceed the following requirements:

<u>Physical Property</u>	<u>Value</u>	<u>ASTM Test Method</u>
Hardness	30	2240
Tensile Strength	100	D412
Elongation %	500	D412
Specific Gravity	1.18	D792

PART 3 EXECUTION

3.1 GENERAL

- A. Unless otherwise shown, waterstops of the type specified herein, shall be fully continuous for the extent of the joint. The Contractor shall take suitable precautions and means to

support and protect the waterstops during the progress of the Work and shall repair or replace at its own expense any waterstops damaged during the progress of the Work.

- B. Suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.
- C. Splices in waterstops shall be performed by heat-sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations. It is essential that the splices have a tensile strength of not less than sixty percent (60%) of the unspliced materials tensile strength and the continuity of the waterstop ribs and of its tubular center axis be maintained.

3.2 INSTALLATION OF WATERSTOP

- A. All joints with waterstops involving more than two (2) ends to be jointed together and all joints which involve an angle cut, alignment change or the joining of two (2) dissimilar waterstop sections shall be prefabricated by the Contractor prior to placement in the forms, allowing not less than 24-inch long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated waterstop joint assemblies shall be installed in the forms and the ends of the 24-inch strips shall be butt welded to the straight run portions of waterstop in place in the forms.
- B. Adequate provisions must be made to support the waterstops during the progress of the Work and to ensure the proper embedment in the concrete. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Maximum density and imperviousness of the concrete shall be ensured by thoroughly working it in the vicinity of all joints.
- C. Adequate means shall be provided to prevent waterstops from being folded over by the concrete as it is placed. Unless otherwise shown, all waterstops shall be held in place with light wire ties on 12-inch centers which shall be passed through the edge of the waterstop and tied to the curtain of reinforcing steel. In placing concrete around horizontal waterstops, with their flat face in a horizontal plane, concrete shall be carefully worked under the waterstops so as to avoid the formation of air and rock pockets.
- D. Where a bentonite waterstop is called for in the Contract Documents, it shall be installed in accordance with the manufacturer's instructions. The bentonite waterstop shall be located at the center of the joint and it shall be continuous around the entire joint. Bentonite waterstop shall not be used in joints with only one curtain of reinforcing steel. Where a bentonite waterstop is used in combination with PVC waterstop, the bentonite waterstop shall overlap the PVC waterstop for a minimum of 6-inches.

3.3 JOINT CONSTRUCTION

- A. Joint Location: Construction joints, expansion joints and control joints shall be provided where shown. When not shown, construction joints shall be provided at 10 foot maximum

spacing for all concrete construction, unless noted otherwise. The location of all joints shall be submitted for acceptance by the Engineer.

- B. Special care shall be used in preparing concrete surfaces at joints where bonding between two (2) sections of concrete is required. Unless otherwise shown, such bonding will be required at all horizontal joints in walls and wall to slab joints. Surfaces shall be prepared by sandblasting and washing for removal of laitance or any objectionable material. Joints shall be kept clean until the concrete is placed. Vertical joints shall be clean and free of concrete fins, rock pockets or any objectionable material.
- C. Sealant grooves shall be formed as shown on the drawings and shall be protected from damage until final application of the sealant. Care shall be taken to prevent chipping of the sealant groove during removal of forms.

PART 4 MEASUREMENT AND PAYMENT

4.1 The work covered in this section for each item shall be considered incidental to the cost of their respective bid item.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, in accordance with the requirements of the Contract Documents.
- B. The following types of concrete shall be covered in this Section:
 - 1. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, pavements, thrust blocks, fence and guard post embedment, and other concrete ties unless otherwise shown.
 - 2. Structural Concrete: Concrete to be used where noted in the Contract Documents.
 - 3. Lean Concrete: Concrete to be used for pipe trench cut-off walls and cradles, where the preceding items are detailed on the Drawings as un-reinforced.
 - 4. Duct Bank Concrete: Red colored concrete to be used for electrical duct banks.
- C. The term "hydraulic structure" used in these specifications shall refer to environmental engineering concrete structures for the containment, treatment, or transmission of water, wastewater, or other fluids.
- D. Related Sections:
 - 1. Section 03 10 00 - Concrete Forms and Accessories.
 - 2. Section 03 20 00 - Concrete Reinforcement.
 - 3. Section 03 29 00 - Joints in Concrete.
 - 4. Section 03 60 00 - Grout.
 - 5. Section 31 23 17 - Trenching.
 - 6. Section 31 23 23 - Backfill.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 214R - Guide to Evaluation of Strength Test Results of Concrete.
 - 3. ACI 301 - Specifications for Structural Concrete.
 - 4. ACI 305.1 - Specification for Hot Weather Concreting.
 - 5. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 6. ACI 308.1 - Standard Specification for Curing Concrete.
 - 7. ACI 309R - Guide for Consolidation of Concrete.
 - 8. ACI 318 - Building Code Requirements for Structural Concrete.

- B. ASTM International (ASTM):
1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 2. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
 3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 4. ASTM C40M - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
 5. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 6. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 8. ASTM C150/C150M - Standard Specification for Portland Cement.
 9. ASTM C156 - Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane Forming Curing Compounds for Concrete.
 10. ASTM C157/C157M - Standard Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
 11. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
 12. ASTM C192/C192M - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
 13. ASTM C227 - Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar Bar Method).
 14. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
 15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 16. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 18. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
 19. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete.
 20. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
 21. ASTM C1550 - Standard Test Method for Flexural Toughness of Fiber Reinforced Concrete (Using Centrally Loaded Round Panel).
 22. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
 23. ASTM C1579 - Standard Test Method for Evaluating Plastic Shrinkage Cracking of Restrained Fiber Reinforced Concrete (Using a Steel Form Insert).
 24. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
 25. ASTM C1609/C1609M - Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).

26. ASTM C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete.
 27. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- C. DIN (Deutsches Institut Fur Normung, Germany):
1. DIN 1048 Part 5 “Testing Concrete - Testing of Hardened Concrete (Specimens Prepared in Mould)”.
- D. International Organization for Standardization (ISO):
1. ISO 22196 – Measurement of Antibacterial Activity on Plastics and Other Non-porous Surfaces (Modified).
- E. NSF International (NSF):
1. NSF/ANSI Standard 61 - Drinking Water System Components.
- F. U.S. Army Corps of Engineers (COE):
1. CRD-C 48 - Standard Test Method for Water Permeability of Concrete.

1.3 SUBMITTALS

- A. General: Submittals shall be submitted to the Engineer for review in accordance with Section 01 00 00, Contractor Submittals. Submittals shall include, but not be limited to the following:
1. Mix Designs: Prior to beginning the Work and within 14 days of the Notice to Proceed, the Contractor shall submit to the Engineer, for review, the proposed ready-mix supplier and their Laboratory-Certified concrete mix design for each class and type of concrete specified for the Work. Submitted mix designs shall have been performance-tested and certified by an independent laboratory approved by the Owner. All costs related to providing mix design shall be borne by the Contractor. Mix designs shall show the following in accordance with ACI 301:
 - a. Proportions for all materials proposed.
 - b. Mill tests for cement.
 - c. Admixture certification, chloride ion content must be included.
 - d. Aggregate gradation and certification.
 2. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring and the total quantities, by weight of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount allowed to be added at the site for the specific design mix. In addition, each ticket shall state the approved mix design number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the site, when unloading began, and when unloading was finished.
 3. Materials and methods for curing:
 - a. List of curing methods to be used on each type and class of concrete.
 - b. Curing compound.
 - c. Curing blankets and mats.

- d. Evaporation retardant.

1.4 QUALITY ASSURANCE

- A. When required by any applicable permits, such as Construction Industries Division (CID) permits, Contractor shall have reinforcement inspected by the agency with jurisdiction prior to placement of concrete.
- B. General:
 1. Tests on concrete will be field performed in accordance with all requirements of applicable ASTM standards for such tests, including but not limited to obtaining samples, temperature, slump, air entrainment, making and curing specimens, breaking concrete cylinders, and other as may be applicable.
 2. The cost of all laboratory tests on cement, aggregates, and concrete, for the development of the mix design, will be borne by the Contractor. The laboratory must meet or exceed the requirements of ASTM C1077.
 3. Concrete for testing shall be supplied by the Contractor as part of the project cost, and the Contractor shall provide assistance in obtaining samples, and disposal and cleanup of excess material.
 4. Test cylinders will be prepared at the frequency determined by the Owner and Engineer.
- C. Compression Tests:
 1. Compression test specimens will be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to ensure continued compliance with these specifications. Each set of test specimens will be a minimum of 5 cylinders.
 2. 6"x12" cylinders are required by article 1.4.C.2. Be aware that both ASTM and ACI permit the use of 4-inch by 8-inch cylinders.
 3. Compression test specimens for concrete shall be made in accordance with ASTM C31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
 4. If the testing agency uses 4x8 inch cylinders, note that ACI 301 and 318 require three cylinders to be tested for a valid 28-day strength test.
 5. Compression tests shall be performed in accordance with ASTM C39. One test cylinder will be tested at 7 days and 2 at 28 days. The remaining cylinders will be held to verify test results, if needed.
 6. Compression testing will be paid for by the Owner.
- D. Evaluation and Acceptance of Concrete:
 1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, and as specified herein.
 2. All concrete that fails to meet the ACI requirements and these specifications, is subject to removal and replacement at the cost of the Contractor.
 3. Concrete delivered to the site that does not meet the requirements as herein specified may be rejected.

1.5 CONSTRUCTION TOLERANCES

- A. The Contractor shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 117.
- B. The following construction tolerances are hereby established and apply to finished walls and slabs unless otherwise shown:

<u>Item</u>	<u>Tolerance</u>
Variation of the constructed linear outline from the established position in plan.	In 10 feet: 1/4-inch In 20 feet or more: 1/2-inch
Variation from the level or from the grades shown.	In 10 feet: 1/4-inch In 20 feet or more: 1/2-inch
Variation from the plumb.	In 10 feet: 1/4-inch In 20 feet or more: 1/2-inch
Variation in the thickness of slabs and walls.	Minus 1/4-inch; Plus 1/2-inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus 1/4-inch

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: Except as otherwise specified, all cement shall be standard brand portland Cement conforming to ASTM C150 for Type II, low alkali. Portland cement shall contain not more than 0.60 percent total alkalis. The term "alkalies" is defined as the sum sodium oxide (Na₂O), potassium oxide (K₂O), calculated as sodium oxide (.658 K₂O). Only one (1) brand of cement shall be used for exposed concrete in any individual structure. The cement shall be suitably protected from exposure to moisture until used. Certified mill test reports for each shipment of cement to be used shall be submitted to the Engineer. Mill test reports shall include the alkali content.
- B. Supplementary Cementitious Materials (SCM) include:
 - 1. Fly ash/pozzolan shall conform to ASTM C618, including the requirements of Table 1A, therein, and the following supplementary requirements:
 - a. Class C Fly Ash
 - Loss on ignition, maximum 1%
 - SO₃ content, maximum 4%
 - Moisture content, maximum 1%
 - R = (CaO - 5%)/(Fe₂O₃), maximum 4.5

- b. Class F Fly Ash

Loss on ignition, maximum	1%
SO ₃ content, maximum	3%
Moisture content, maximum	1%
R = (CaO - 5%)/(Fe ₂ O ₃), maximum	1.5
 - c. Fly ash shall be proportioned by weight of cement to provide a fly ash to portland cement ratio not less than 1:4 and not less than 25 percent of the total cementitious material. Portland cement concrete submitted under this specification shall be proportioned with Class F fly ash, unless a variance is authorized by the Engineer per conditions specified in paragraph 2.3.D below. Alternatively, lithium-based admixture can be used in lieu of Class F fly ash to mitigate ASR. The Contractor shall provide the Engineer with chemical and physical analysis of the fly ash.
 - 2. Slag Cement shall conform to ASTM C989, Grade 100 or 120. Slag cement may be added to the mix and shall be proportioned by weight of cement to provide a slag cement to portland cement ratio of no greater than 80 percent.
 - 3. Silica Fume shall conform to ASTM C1240. Silica fume may be added to the mix and shall be proportioned by weight of cement to provide a silica fume to portland cement ratio not less than 1:25 and no greater than 1:7.
 - 4. Metakaolin shall conform to ASTM C618, Class N.
- C. Water shall conform to ASTM C1602/C1602M, and be potable, clean and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purpose of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.
- D. All concrete aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, sound, uniformly graded and free of deleterious material in excess of allowable limits specified. Combined aggregates shall be well graded from coarse to fine sizes, and be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Lightweight sand for fine aggregate will not be permitted. Aggregates shall conform to ASTM C33.
- 1. Coarse Aggregate: Coarse aggregate shall consist of gravel, crushed gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter or other foreign substances. Thin or elongated pieces having a length greater than four (4) times the average thickness shall not exceed fifteen percent (15%) by weight. Deleterious substances shall not be present in excess of the following percentages by weight, and in no case shall the total of all deleterious substances exceed one and one-half percent (1.5%):

Soft Fragments	1.5%
Shale	1.5%
Coal and Lignite	0.25%
Clay Lumps	0.25%
Materials Finer than No. 200 Sieve	0.50%*

*Except that when material finer than No. 200 sieve consists of crusher dust, the maximum amount maybe 1%.

Except as otherwise specified or approved in writing by the Engineer, coarse aggregate shall be graded as specified in ASTM C33, size No. 57.

2. Fine Aggregate: Fine aggregate for concrete or mortar shall consist of clean, natural sand or a combination of natural and manufactured sands that are hard and durable. Deleterious substances shall not be present in excess of the following percentages by weight of contaminating substances. In no case shall the total exceed three percent (3%):

Removed by Decantation (Dirt, Silt, Etc.)	3%
Shale	1%
Clay Lumps	1%

Fine aggregate shall not contain strong alkali nor organic matter which gives a color darker than a standard color when tested in accordance with ASTM C40. Fine aggregate shall have a fineness modulus not less than 2.50 nor greater than 3.00. Except as otherwise specified, fine aggregate shall be graded from coarse to fine in accordance with the requirements of ASTM C33.

- E. If non-reactive aggregates are unavailable, and either the coarse or fine aggregates are found to be alkali-silica reactive, the Contractor shall submit a proposed design mix that effectively mitigates the alkali-silica reactivity, per ASTM C1778. Supplementary cementitious materials or lithium-based admixture or a combination of both will be considered effective if the mean mortar bar expansion at 14 days is less than or equal to 0.10%, when determined in accordance with the performance-based approach provided in ASTM C1778.
- F. Admixtures of any type, except as otherwise specified, shall not be used unless written authorization has been obtained from the Engineer. The use of calcium chloride or admixtures containing intentionally-added chlorides will not be permitted. Admixtures will be compatible as documented by mix design history.
 1. Air-Entraining Agent: ASTM C260, or U.S. Army Corps of Engineers Specifications CRD-C13.
 2. Water-Reducing Admixture: ASTM C494/C494M Type A.
 3. Mid-Range Water-Reducing Admixture: ASTM C494/C494M Type A.
 4. High-Range Water-Reducing Admixture: ASTM C494/C494M Type F.
 5. High-Range Water-Reducing and Retarding Admixture: ASTM C494, Type G.
 6. Accelerating Admixture: ASTM C494/C494M Type C or E.
 7. Retarding Admixture: ASTM C494/C494M Type B or D.
 8. Hydration Control Admixture: ASTM C494/C494M Type B or D.
 9. Workability-Retaining Admixture: ASTM C494/C494M Type S.

- a. Shall retain concrete workability without affecting time of setting or early-age strength development.
10. Permeability-Reducing Admixture:
 - a. 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.
 - b. Shall show a reduction in permeability of concrete compared to an identical concrete mixture without the admixture, when tested in accordance with CRD-C 48 at a pressure of 200 psi (equivalent to 460 ft. of head).
 - c. Shall reduce or have no penetration of water compared to an identical concrete mixture without the admixture, when tested in accordance with DIN 1048 for a duration of 96 hours.
11. Corrosion-Inhibiting Admixture:
 - a. Shall be a nominal 30 percent solution of calcium nitrite or an amine/ester-based organic corrosion-inhibiting admixture.
12. Shrinkage-Reducing Admixture: ASTM C494/C494M Type S.
13. Alkali-Silica Reaction Inhibiting Admixture: ASTM C494/C494M Type S.
 - a. Shall contain a nominal lithium nitrate content of 30 percent.
14. Antimicrobial Admixture: ASTM C494, Type S.
 - a. Shall be EPA-registered.
 - b. Concrete treated with antimicrobial admixture shall show significant reduction in antibacterial activity compared to associated untreated (control) samples based on a modified version of the ISO 22196 test method.

2.2 CONCRETE CURING MATERIALS

- A. Evaporation Retardant: Shall be a monomolecular film-forming liquid for application to fresh concrete to prevent rapid drying of the surface.
- B. Materials for curing concrete shall conform to the following requirements:
 1. Concrete curing compound shall be Protex LR-151 as manufactured by Protex Industries, Denver, CO; Hunt Process Clear ARB as manufactured by Hunt Process Co., Santa Fe Springs, CA; Select Cure CRB as manufactured by Select Products Co., Upland, CA; or equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.
 2. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a normal thickness of 10 mils.
 3. Burlap, cotton mats or other covering material for use as concrete curing blanket must be overlapped adequately to ensure 100% coverage at all times, and must not be allowed to become dry at any point during the curing period
 4. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.
- C. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete

2.3 CONCRETE DESIGN REQUIREMENTS

- A. General: The concrete mixes shall be designed to produce a concrete of such consistency and composition so as to obtain maximum density and minimum shrinkage. Mix designs with more than forty-one percent (41%) of sand of the total weight of fine and coarse aggregate shall not be used.
- B. All concrete shall contain five percent (5%), plus or minus one percent (1%) entrained air of evenly dispersed air bubbles at the time of placement. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement. The Engineer or Owner and his duly authorized representatives reserve the right, at any time, to sample and test the air-entraining agent or the air content of concrete received on the job by the Contractor. Air entrainment in the concrete shall be tested by ASTM C138, ASTM C231 or ASTM C173. If any sample tested does not have the specified air content, a second test shall be performed. If the second test does not meet the specified air content, the concrete represented by the test shall be removed from the job.
- C. Water-Cementitious Materials Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall not be less than that specified in the following Table:

Type of Work	Min. 28-Day Compressive Strength (psi)	Max. Size Aggregate (in.)	Min. Cement W/C per CY (94# sacks)	Maximum w/cm (by wt.)
Slabs on grade, footings, floor slabs, and all other concrete items not specified elsewhere.	4,000	1	6.0	0.50
Site work concrete such as fence posts, thrust blocks, valve collars, etc.	3,000	1	5.0	0.50

- D. Adjustments to Mix Design: The mixes used shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.
- E. At the Contractors option, fly ash or other supplementary cementitious materials may be used as a partial cement replacement in concrete as follows:
 1. Fly ash shall replace not more than twenty-five percent (25%) by mass of the portland cement in the design mix. The design mix shall contain a minimum of six (6) sacks of cement per cubic yard before the replacement is made.
 2. Fly ash for hydraulic/liquid containing structures shall be Class F fly ash. Fly ash concrete for all other structures shall be Class C or F fly ash.
 3. If the coarse or fine aggregates are proven to be potentially alkali-silica reactive per ASTM C227, the SCM Class F fly ash shall be proportioned by mass of cement to provide a fly ash to portland cement ratio not less than 1:4 and not less than 25

percent of the total cementitious material. The Contractor shall provide the Engineer with chemical and physical analysis of the fly ash, and detailed design mix to meet the requirements in accordance with the performance-based approach provided in ASTM C1778.

4. Replacement levels of supplementary cementitious materials and the dosage of lithium nitrate based admixtures shall be determined in accordance with the performance-based approach provided in ASTM C1778.
- F. A "superplasticizer" (high-range water-reducing) admixture may be used at the Contractor's option, subject to approval by the Engineer, for concrete in hydraulic structures. The amount of cement in the mix shall not be reduced. The slump may be increased to a maximum of 9-inches. Quantities of admixtures and procedures shall be in accordance with the manufacturers published recommendations.

2.4 CONSISTENCY

- A. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

<u>Part of Work</u>	<u>Slump (inches)</u>
Footings and Slabs	3-inches + 1/2-inches, - 1 inch.
Other Work	3-inches \pm 1-inch.
With High Range Water Reducer Added	9-inches maximum.

2.5 TRIAL BATCH AND LABORATORY TESTS

- A. Before placing any concrete, the Contractor shall submit the certified trial batch results of each class of concrete having a 28-day strength of 3,500 psi or higher, based on the preliminary concrete mixes submitted by the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractors preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using the aggregates, cement and admixture proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain three (3) drying shrinkage, and six (6) compression test specimens from each batch. The costs for the trial batch tests shall be borne by the Contractor.
- B. The determination of compressive strength will be made by testing cylinders as defined in Article 1.4 herein; made, cured and tested in accordance with ASTM C192 and ASTM C39. Three (3) compression test cylinders will be tested at 7-days and three (3) at 28-days. The average compressive strength for the three (3) cylinders tested at 28-days for any given trial batch shall not be less than one hundred twenty-five percent (125%) of the specified compressive strength.
- C. A standard sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements for ASTM C136. Values shall be given for percent passing each sieve.

2.6 SHRINKAGE LIMITATION

- A. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10-inches, fabricated, cured, dried and measured in accordance with ASTM C157 modified as follows: Specimens shall be removed from molds at an age of 23+ hours after trial batching, shall be placed immediately in water at 70 degrees F. +3 degrees F. for at least thirty (30) minutes, and shall be measured within thirty (30) minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F. +3 degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7-days. This length at age 7-days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F. +3 degrees F. and fifty percent (50%) +4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21 and 28-days of drying after 7-days of moist curing.
- B. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001-inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004-inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing during shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be specified herein.
- C. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age, shall be 0.036 percent or 0.042 percent, respectively. The Contractor shall only use a mix design for construction that has first met the trial batch shrinkage requirements.
- D. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than twenty-five percent (25%).
- E. If the required shrinkage limitation is not met during construction, the Contractor shall take all necessary action, at no additional cost to the Owner, for securing the specified shrinkage requirements. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water content ratio; washing or aggregate to reduce fines; increasing the number of construction joints; modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

2.7 CEMENT GROUT

- A. Cement grout materials shall be as specified in Section 03 60 00 - Grout.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 MIXING CONCRETE

- A. Mixing equipment shall be subject to the Engineers approval. Mixers shall be of the stationary plant or truck mixer type. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials and for readily changing the proportions of the material. The mixing equipment shall be maintained in good working order and shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass and of discharging the mixture without segregation. Cement and aggregate shall be proportioned by weight.
- B. The batch plant shall be capable of controlling and delivering of all material to within one percent (1%) by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale that will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
 - 1. Cement shall not come in contact with aggregate or with water until the materials are in the mixer ready for complete mixing with all mixing water. The procedure of mixing cement with sand or with sand and coarse aggregate for delivery to the jobsite for final mixing and an addition of mixing water will not be permitted. Retempering of concrete (addition of water to previously prepared concrete mix) will not be permitted. The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturers rated capacity of the mixer.
 - 2. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed. Each mixer shall be equipped with a device for automatically measuring, indicating and controlling the time required for mixing. This device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period.
 - 3. Transit-mixed concrete shall be mixed and delivered in accordance with ASTM C94. After the drum is once started, it shall be revolved continuously until it has completely discharged its batch. Water shall not be admitted to the mix until the drum has started revolving. The right is reserved to increase the required minimum number of revolutions allowed, if necessary, to obtain satisfactory mixing, and the Contractor will not be entitled to additional compensation because of such an increase or decrease.

- C. Mixed concrete shall be delivered to the site of the work and discharge shall be completed within one (1) hour after the addition of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F. or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed forty-five (45) minutes. The use of non-agitating equipment for transporting concrete will not be permitted.
- D. Truck mixers shall be equipped with counters so that the number of revolutions of the drum may be readily verified. The counter must be capable of being reset and shall be actuated at the time of starting mixers at mixing speeds. Concrete shall be mixed in a truck mixer for not less than seventy (70) revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

3.3 PREPARATION OF SURFACES FOR CONCRETING

- A. Earth surfaces shall be thoroughly and uniformly wetted by sprinkling prior to the placing of any concrete. These surfaces shall be kept moist by frequent sprinkling up to the time concrete is placed thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.
- B. The surfaces of all horizontal construction joints shall be cleaned of all laitance, loose or defective concrete and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- C. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel and preparation off surfaces involved in the placing have been completed and accepted by the Engineer at least four (4) hours before placement of concrete. All reinforcement, anchor bolts, sleeves, inserts and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor. All surfaces of embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- D. All form surfaces in contact with the concrete shall be thoroughly cleaned of all previous concrete, dirt and other surface contaminants prior to use. Damaged form surfaces shall not be used.
 - 1. Wood form surfaces in contact with the concrete shall be coated with an approved release agent prior to form installation. The release agent shall be non-staining and non-toxic after thirty (30) days. Mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface of steel forms.

2. All steel forms shall have the contact surfaces coated with an approved release agent. The release agent shall be effective in preventing discoloration of the concrete from rust and shall be non-toxic after thirty (30) days.
- E. Where concrete is to be cast against old existing concrete, the old concrete shall be thoroughly roughened to exposed, hard aggregate by sandblasting or chipping. Any additional surface preparation shall be as called for in the drawings.
- F. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or diverted out of the forms and clear of the work. No concrete shall be deposited under water or allowed to rise on any concrete until the concrete has attained its initial set. Pumping or other necessary dewatering operations for removing ground water, if required, shall be the responsibility of the Contractor and will be subject to review by the Engineer.
- G. Pipe, conduit, dowels, sleeves and other ferrous items required to be embedded in concrete construction shall be adequately positioned and supported prior to placement of concrete. There shall be a minimum of 2-inches clearance between embedded items and any of the concrete reinforcement. Securing embedments in position by wiring or welding them to the reinforcement will not be permitted.

3.4 PLACING CONCRETE

- A. No concrete shall be placed without prior inspection of the forms, reinforcing and embedded items and approval from an authorized representative of the Engineer. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of any scheduled concrete placement and shall call for final inspections no later than four (4) hours in advance of the scheduled placement. The Contractor shall notify the Engineer at least two (2) hours in advance of setting the opposite side of wall forms so that the construction joint preparation, water stop installation and reinforcing steel inspections can be conducted. It is the Contractors responsibility to see that the forms are properly cleaned and oiled before being set, the construction joints properly prepared, reinforcing steel is securely and properly supported in the correct position and that all embedment items including electrical conduit is correctly installed before calling for inspections. The Engineer may at his option require the use of placement cords if deemed necessary.
- B. Placement of concrete shall conform to the requirements and recommendations of ACI 301, 304R, 305.1, 306.1, and 318, except as modified herein.
- C. Concrete, which upon or before placing is found not to conform to the requirements specified herein, shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these specifications, or which is of inferior quality, shall be removed and replaced at the expense of the Contractor.
- D. No concrete shall be placed during rain or snow storms, unless completely covered to prevent storm water from coming in contact with it. Sufficient protective covering material shall be kept on hand at all times should rain or snow storms arise during concrete placement operations.

- E. Concrete shall be deposited at or near its final position to avoid segregation caused by rehandling or flowing. Concrete shall not be deposited in large quantities in one place and worked along the forms with vibrator or other means. Concrete shall be uniformly distributed during the placing process and in no case after depositing shall any portion be displaced in the forms more than 2-feet in horizontal direction. Concrete shall be deposited in forms in horizontal layers not to exceed 24-inches in depth and shall be brought up evenly in all parts of the form. The rate of placement of concrete in forms shall not exceed 5-feet of vertical rise per hour. As the concrete is placed it shall be consolidated thoroughly and uniformly by mechanical vibration to secure a dense mass, close bond with reinforcement and other embedded items and smooth surface. The mechanical vibrator shall penetrate not only the freshly placed concrete, but also the previously placed lift to ensure the lifts become monolith. New concrete shall be placed against previously placed concrete, not away from it. When concrete is placed on a slope, placement shall begin at the lower end of the slope and progress to the upper end for the full width of the placement. Consolidation by mechanical vibration shall follow directly behind placement and the rate of placement shall never get ahead of the consolidation crew. Concrete placement shall continue without avoidable interruption, in a continuous operation until the end of the placement is reached.
- F. The drop of concrete into slab or wall forms shall be vertical. Concrete shall not be dropped through reinforced steel, but deposited in forms using a hopper with a drop chute to avoid segregation and to keep mortar from coating the reinforcement steel and forms above the in-place concrete. In no case shall the free fall of concrete exceed 4-feet below the end of the hopper or chute.
- G. If it takes more than 20-minutes to get back to place concrete over concrete previously placed, the depth of the layers being placed at one time shall be reduced, and/or placing equipment increased, until it is possible to return with the placing operation to previously placed concrete within 20-minutes. If concrete is to be placed over previously poured concrete and more than 20-minutes have elapsed, then a layer of grout not less than 1/2-inch thick shall be spread over the surface before placing the additional concrete.
- H. The placement of concrete for slabs, beams or walkways cast monolithically with walls or columns shall not commence until the concrete in the walls or columns has been allowed to set and shrink. The time allowed for shrinkage shall be not less than one (1) hour.
- I. Concrete shall be placed with the aid of approved mechanical vibrators. Vibration shall be supplemented by manual forking or spading adjacent to the forms on exposed faced in order to secure smooth dense surfaces. The concrete shall be thoroughly consolidated around reinforcement, pipes or other shapes built into the work. The vibration shall be sufficiently intense to cause the concrete to flow and settle readily into place and to visibly affect the concrete over a radius of at least 18-inches.
 - 1. Sufficient vibrators shall be on hand at all times to vibrate the concrete as placed. In addition to the vibrators in actual use while concrete is being placed, the Contractor shall have on hand one (1) spare vibrator in serviceable condition. No concrete shall be placed until it has been ascertained that all vibrating equipment, including spares, is in serviceable condition.

- J. Special care shall be taken to place the concrete solidly against the forms so as to leave no voids. Every precaution shall be taken to make all concrete solid, compact and smooth, and if for any reason the surfaces or interiors have voids or are in any way defective, such concrete shall be repaired as directed by the Engineer. No defective work shall be patched or repaired without the prior inspection and approval of the Engineer.
- K. The temperature of concrete when it is being placed shall be not more than 90 degrees F. nor less than 40 degrees F. in moderate weather, and not less than 50 degrees F. in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F., the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. In general, the Contractor shall adhere to the requirements in ACI 305.1 for hot weather concreting, except as required herein. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.
- L. Concrete shall not be placed on a frozen subgrade or subgrade that contains frozen materials. All ice and snow shall be removed from inside forms and from reinforcing steel and embedded items. The temperature of all surfaces that the concrete will contact shall be raised above the freezing point for at least 12-hours prior to placing new concrete.
 - 1. The minimum temperature of fresh concrete as mixed shall be 60 degrees F. for ambient temperature above 30 degrees F.; 65 degrees F. for ambient temperature 0 degrees F. to 30 degrees F.; and 70 degrees F. for ambient temperature below 0 degrees F. The minimum temperature of fresh concrete after placing shall be 55 degrees F. for the first 72-hours.
 - 2. The use of calcium chloride shall not be permitted.
 - 3. In general, the Contractor shall adhere to the requirements in ACI 306.1 for cold weather concreting, except as required herein.

3.5 PUMPING OF CONCRETE

- A. Pumping of concrete will be permitted only with the Engineer's approval. The pumping equipment must have two (2) cylinders and be designed to operate with one (1) cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor shall have a standby pump or crane and concrete bucket on site during pumping to provide assurance the concrete will be placed without cold joints in the event of pumping equipment breakdown. The minimum diameter of the hose (conduits) shall be 4-inches. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced. Aluminum conduits for conveying the concrete will not be permitted.
- B. Concrete samples for slump and test cylinders will be taken at the discharge end of the pumping conduit.

3.6 ORDER OF PLACING CONCRETE

- A. The order of placing concrete in all parts of the work shall be acceptable to the Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 7-days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least 14-days.
- B. The surface of the concrete shall be level whenever a run of concrete is stopped. To ensure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one (1) hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel.

3.7 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets and bringing only a slight excess of water to be exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are horizontal, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred or worked with suitable appliances, tamping bars, shovels or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with fifteen (15) minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.8 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles and dimensions

shown are defined as tolerances and are specified in Paragraph 1.5, herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

- B. Unformed Surfaces: After placing and consolidating concrete, all unformed top surfaces of slabs, walls, curbs, gutter and steps, shall be brought to a uniform finished surface. The classes of finish specified for unformed concrete surfaces are defined as follows:
1. Finish U1: Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
 2. Finish U2: After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where shown or as determined by the Engineer.
 3. Finish U3: After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples and trowel marks. The finish shall be smooth and free of all irregularities.
 4. Finish U4: Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a non-skid finish.
- C. The schedule for finished unformed surfaces shall be as follows:

<u>Area</u>	<u>Finish</u>
Grade slabs and foundations to be covered with concrete or fill material.	U1
Floor slabs to be covered with grouted tile or topping grout and slabs to be covered with built-up roofing.	U2
All building and machine room floors, basin floors not receiving a grout topping, channel floors, top of interior walls, top of interior curbs, steps and walkways. Grout Surfaces in Bottom of Clarifier and DAF.	U3
Exterior walkways, curb, gutter, sidewalk and steps, top of valve or meter vaults, electrical pull boxes and catch basins. Grout surface in Clarifier and DAF Launderers.	U4

- D. Floor Sealer Hardener (Surface Applied):
1. Floor hardener shall be applied where shown or noted on the drawings.
 2. Floors to receive hardener shall be cured, cleaned and dry with all work above them completed. Apply zinc and/or magnesium fluosilicate evenly, using three (3) coats, allowing 24-hours between coats.
 3. The first coat shall be 1/3 strength, second coat 1/2 strength and third coat shall be 2/3 strength. Each coat shall be applied so as to remain set on the concrete surface for fifteen (15) minutes. If sodium silicate is used, it shall be applied evenly, using three (3) coats, allowing twenty-four (24) hours between coats, and the material shall be applied full strength at the rate of one (1) gallon per 300 square feet. Approved proprietary hardeners shall be applied in conformance with the manufacturer's instructions. After the final coat is completed and dry, surplus hardener shall be removed from the surface by scrubbing and mopping with water.
- E. Formed Surfaces: Immediately following the removal of forms, the concrete shall be inspected for defects such as rock pockets, grout loss, damage from stripping forms, surface defects such as fins, offsets, bulges, excessive bug-holes and stains. All defective concrete work shall be removed and replaced or repaired to the satisfaction of the Engineer. Any work which has not been constructed in accordance with the plans and specifications will be considered defective.

Correction of defective work shall be as directed by the Engineer and specified herein. No defective work shall be patched, repaired or covered without prior inspection and approval of the Engineer.

Holes left by tie-rod cones or taper ties shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with non-metallic grout.

The classes of formed concrete surfaces are defined as follows:

1. Finish F1: No special treatment is required after form removal except for curing, repair of defective concrete treatment of surface defects, removal of fins and projections, filling of tie holes and filling of depressions and bug-holes 3/8-inch or larger in width or depth with mortar.
2. Finish F2: All defective concrete shall be repaired, all fins, offsets, bulges and projections ground smooth, filling of tie holes and filling of depressions and bug-holes 1/4-inch or larger in width or depth with mortar.
3. Finish F3: All defective concrete shall be repaired, all fins, offsets, bulges and projections ground smooth and tie holes filled with grout. The entire surface shall then receive a light stoning or grinding using a No. 50 or No. 60 grit carborundum stone or grinding wheel to remove any laitance and curing film and to open up bug-holes hidden beneath the thin surface grout film. The surface shall then be given a stoned-sand type architectural finish as follows:
 - a. The concrete surface shall be pre-wet for several hours or overnight before treatment.
 - b. While the surface is still damp, spread a sand mix, consisting of one (1) part of Type II Cement and one to one and a half (1 to 1-1/2) parts of fine

sand passing the No. 70 screen mixed with enough water and an emulsified bonding agent to have the consistency of thick cream. The sand mix should be spread thinly over the damp surface with a rubber float and rubbed in over the entire area leaving only a minimum amount of material on the surface necessary to produce a sand texture, approximately 1/32-inch in thickness.

- c. The surface shall be kept continually damp for seventy-two (72) hours following this finish treatment.

F. The schedule for formed surface finish shall be as follows:

<u>Area</u>	<u>Finish</u>
Formed concrete surfaces to be covered by backfill or coated with below grade waterproofing systems.	F1
Formed concrete surfaces in water channels, below water surface of basins, inside meter and valve vaults, inside cells of hydraulic splitter boxes and weirs.	F2
Formed concrete surfaces inside buildings and machine rooms and all exposed exterior surfaces of foundations, basins, vaults, hydraulic structures and curbs.	F3

3.9 CURING AND DAMPPROOFING

- A. General: All concrete shall be cured for not less than ten (10) days in warm to hot weather (per ACI 305.1) and fourteen (14) days in cold weather (per ACI 306.1) after placing, unless otherwise indicated by the Engineer, in accordance with the methods specified herein for the different parts of the Work, and described in detail as follows:
 - 1. Water Curing: Keep the concrete structures thoroughly and continuously wet and covered for at least 7 days. Place and anchor covers, mats, and sheeting to ensure continuous contact with the concrete surfaces. Use one of the water curing methods as detailed in ACI 308.1.
 - 2. Curing Compound: The surface shall be sprayed with a liquid membrane-forming curing compound applied in accordance with the manufacturers printed instructions.
 - a. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
 - b. Curing compound specified shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within one (1) hour after removal of forms from contact with formed surfaces. Repairs to formed surfaces shall be made within the said one (1) hour period. If repairs cannot be made with the one (1) hour period they shall be delayed until after the curing compound has been applied. When

repairs are to be made to an area on which curing compound has been applied, the area involved shall first be sandblasted to remove the curing compound, following which repairs shall be made as specified herein.

3. Cold weather is defined in ACI 308.1 as “a period when the average daily ambient temperature is below 40°F for more than three successive days. (Note: The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50°F occur during more than half of any 24-hour duration, the period shall no longer be regarded as cold weather.)”
- B. Method 2 shall be used for wall sections with forms removed, encasement concrete and all concrete surfaces where Method 1 is not feasible.

3.10 PROTECTION

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damage to finish surfaces.
- B. Finished floor slabs in buildings and machine rooms shall be suitably protected from wear or damage from construction operations. The Contractor shall not use newly finished floors or buildings for machine assembly, fabrication, pipefitting, curing or welding operations without covering the working area with plastic sheets and/or plywood. Any concrete found to be damaged or which may have been originally defective or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.
- C. Immediately following the first frost in the fall, the Contractor shall be prepared to protect all concrete against freezing.

3.11 CURING IN COLD WEATHER

- A. After the first frost, and until the mean daily temperature in the vicinity of the worksite falls below 40 degrees F for more than one (1) day, the concrete shall be protected against freezing temperatures for not less than forty-eight (48) hours after it is placed. After the mean daily temperature in the vicinity of the worksite falls below 40 degrees F. for more than one (1) day, the concrete shall be maintained at a temperature not lower than 50 degrees F. for at least seventy-two (72) hours after it is placed.
- B. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F. over a (3) three day duration.
- C. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of

concrete adjacent to the heaters are protected from drying and excessive carbon dioxide atmosphere by application of curing Method 2 or Method 3, as specified under Article 3.9, Paragraph A herein.

3.12 REPAIR OF DEFECTIVE CONCRETE

- A. No concrete repairs shall be made until after inspection and approval of the method of repair by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing extensive voids, holes, honeycombing or similar depression defects shall be completely removed and replaced. Concrete containing minor voids, holes, honeycombing or similar depression defects shall be repaired as specified herein. All concrete repairs and replacements shall be promptly executed by the Contractor at its own expense.
- B. Prior to filling any structure with water, all cracks that may have developed shall be "vee'd" as shown on the Drawings and filled with construction joint sealant conforming to the requirements under Section 03 29 00 - Joints In Concrete. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane shall also have cracks repaired as specified herein.
- C. The repair of holes left by rock pockets, penetrations, tie rods or other reasons will require the use of non-shrink, non-metallic grout material.

PART 4 MEASUREMENT AND PAYMENT

4.1 The work covered in this section for each item shall be considered incidental to the cost of their respective bid item.

END OF SECTION

SECTION 03 60 00

GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish, place, finish and cure the following types of grouting mortars as called for herein and as shown in the Contract Documents.
 - 1. Non-Shrink Grout: This type of grout shall be used wherever grout is shown or called for in the Contract Documents, unless another type is specifically referenced.
 - 2. Topping Grout: This type of grout shall be used for grouting in submerged applications, such as clarifier bottoms.
 - 3. Epoxy Grout: This type of grout shall be used for anchor bolt or reinforcing steel embedment, repairs and resurfacing.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
- B. American Society of Testing and Materials:
 - 1. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 2. ASTM C109 - Standard Test Method for Compressive (Latest Edition) Strength of Hydraulic Cement Mortars (Using 2-inch or 50-mm Cube Specimens).
 - 3. ASTM C150 - Standard Specification for Portland Cement.
 - 4. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- C. U. S. Army Corps of Engineers Concrete Research Division (CRD):
 - 1. CRD C621 - Non-Shrink Grout.

1.3 SUBMITTALS

- A. Non-Shrink Grout: Submit manufacturers technical data including compressive strength and expansion data at plastic, flowable and fluid consistencies. Also submit manufacturer's applications manual containing instructions and recommendations for mixing, handling, placement and appropriate uses for each type of non-shrink grout used in the work.
- B. Topping Grout: Provide certified mix design including proportions and gradations of all materials and compressive strength test results from at least one (1) trial batch. Tests shall

be performed by a certified testing laboratory. All costs for such mix design and trial batch tests shall be borne by the Contractor.

- C. Epoxy Grout: Submit manufacturers technical data including strengths and application manual of instructions for mixing, handling and placing.

1.4 QUALITY ASSURANCE

- A. Mix design tests for topping grout shall be performed per the standards referenced herein.
- B. During the progress of construction the Engineer may have tests made of each type of grout used in the work to ensure compliance with the Contract Documents. These tests will be made in accordance with the standards referenced herein. The test expense during construction, except for the mix design and trial batch tests, will be borne by the Owner. The costs of additional tests including non-destructive tests and core drilling needed to verify or investigate the quality of questionable work or material shall be borne by the Contractor.
- C. Grout for testing shall be supplied by the Contractor at no cost to the Owner.
- D. If any grout fails to meet the requirements of these specifications, immediate corrective action shall be taken for all subsequent batches. Grout already in place that fails to meet these requirements is subject to removal and replacement with all costs borne by the Contractor.
- E. Construction tolerances shall be as specified in Section 03 30 00 - Cast-In-Place Concrete, except as modified herein and elsewhere in the Contract Documents.

PART 2 PRODUCTS

2.1 NON-SHRINK GROUT

- A. Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged.
- B. Non-shrink grouts for use as herein specified shall conform to the Corps of Engineers specifications for Non-Shrink Grout, CRD-C621-85 and to these specifications. The grout shall have a 28-day compressive strength of 6,000 psi or greater.
- C. Non-shrink grouts shall be as manufactured by: Tremcrete Systems Inc., Woodland, California; Gifford-Hill & Company, Inc., Dallas, Texas; or approved equal.

2.2 TOPPING GROUT

- A. Grout for topping of slabs and concrete fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and

admixtures proportioned and mixed as indicated herein. All materials and procedures specified for concrete in Section 03 30 00 shall apply except as indicated otherwise herein.

- B. Topping grout and concrete fill shall contain a minimum of 564 pound of cement per cubic yard with a maximum water cement ratio of 0.45. Where concrete fill is thicker than 3 inches, structural concrete as indicated in Section 03 30 00 may be used when accepted by the Engineer.
- C. Coarse aggregate shall be graded as follows:

U.S. STANDARD SIEVE SIZE	PERCENT BY WEIGHT PASSING
1/2"	100
3/8"	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

- D. Final mix design shall be as determined by trial mix design under supervision of the approved testing laboratory.
- E. Strength: Minimum compressive strength at 28-days shall be 4,000 psi.

2.3 EPOXY GROUT

- A. Epoxy grout shall be a pourable, non-shrink, one-hundred percent (100%) solids system. The epoxy grout system shall have three components; resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application. Manufacturer’s instructions shall be printed on each container in which the materials are packaged.
- B. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F. The epoxy grout shall develop a minimum compressive strength of 5,000 psi in 24-hours and 10,000 psi in 7-days.

2.4 CEMENT GROUT

- A. Portland Cement: ASTM C150, Type I and II.
- B. Water: ASTM C1602/C1602M.
 - 1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
 - a. Corrosion of steel.

- b. Volume change increasing shrinkage cracking.
 - c. Efflorescence.
 - d. Excess air entraining.
- C. Fine Aggregate:
 - 1. Washed natural sand.
 - 2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
 - 3. Free from injurious amounts of organic impurities as determined by ASTM C40.
- D. Mix:
 - 1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.
 - 2. Water content shall be such that the grout can be readily spread, yet not wet enough to cause trouble with surface water or laitance, or failure to stay in place after screeding. All grout mixes and mixing procedures shall be submitted in accordance with Section 01 00 00 - Contractor Submittals, and shall be subject to review and approval by the Engineer prior to commencing the grouting operations.
- E. The minimum compressive strength at 28 days shall be 4000 psi.
- F. Procedures for Grout placement shall be approved by the equipment supplier, to ensure that no equipment is overstressed, as well as proper placement tolerances

2.5 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as required for the particular application.
- B. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

2.6 CURING MATERIALS

- A. Curing materials shall be as specified in Section 03 30 00 - Cast-In-Place Concrete, for cement topping grout and as recommended by the manufacturer of non-shrink grouts.

PART 3 EXECUTION

3.1 PREPARATION

- A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 03 30 00. The finish of the grout surface shall match that of the adjacent concrete

- B. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.
- C. Rough concrete lightly, but not enough to interfere with placement of grout.
- D. Remove foreign materials from metal surfaces in contact with grout.
- E. Align, level and maintain final positioning of components to be grouted.
- F. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.2 PLACING NON-SHRINK AND EPOXY GROUT

- A. All forming, mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Place grout material quickly and continuously.
- C. Do not use pneumatic-pressure or dry-packing methods.
- D. Apply grout from one side only to avoid entrapping air.
- E. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.
- F. Thoroughly compact final installation and eliminate air pockets.
- G. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.3 PLACING TOPPING GROUT

- A. All mechanical, electrical, and finish work shall be completed prior to placement of topping or concrete fill. The base slab shall be given a roughened textured surface by sandblasting or hydroblasting exposing the aggregates to ensure bonding to the base slab.
- B. The minimum thickness of grout topping and concrete fill shall be one inch, unless otherwise indicated on the Design Drawings. Where the finished surface of concrete fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2-inches wide by 1-1/2-inches deep.
- C. The base slab shall be thoroughly cleaned and wetted prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat Type II cement grout shall be broomed into the surface of the slab just before topping or fill placement. The topping and fill shall be compacted by rolling or tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades

attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade.

- D. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
- E. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping and fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

3.4 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

3.5 CURING

- A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. After grout has attained its initial set, keep damp for minimum of 7 days, or as otherwise indicated by the manufacturer.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. Refer to Sheet G-001 of the Drawings for additional specifications related to structural steel. Where any contradiction may exist between the data and requirements presented on Sheet G-001 of the Drawings, and the specifications of this Section, the information on the Drawings takes precedence.
- B. Section Includes:
 - 1. Structural shapes.
 - 2. Channels and angles.
 - 3. Hollow structural sections.
 - 4. Structural pipe.
 - 5. Structural plates.
 - 6. Fasteners, connectors, and anchors.
 - 7. Grout.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate sizes, spacing, and locations of structural members and welded connections.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC Seismic Provisions for Structural Steel Buildings.
 - 3. RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- B. Perform Work in accordance with New Mexico Public Works Standards, latest revisions.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural W-Shapes: ASTM A992/A992M; Grade 50.
- B. Structural M-Shapes, S-Shapes, Channels and Angles: ASTM A36/A36M.
- C. Round Hollow Structural Sections: ASTM A500, Grade B; FY = 446 ksi.
- D. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade B.

- E. Structural Pipe: ASTM A53/A53M, Grade B; Type E or S; FY = 35 ksi.
- F. Structural Plates: ASTM A36/A36M.
- G. Furnish materials in accordance with New Mexico Public Works Standards, latest revisions.

2.2 FASTENERS, CONNECTORS, AND ANCHORS

- A. Bolts: ASTM A307; Grade A or B.
 - 1. Finish: Mechanically galvanized.
- B. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Mechanically galvanized.
- C. Washers: ASTM F436; Type 1, circular.
 - 1. Finish: Mechanically galvanized.
- D. Direct Tension Indicators: ASTM F959; Type 325.
 - 1. Finish: Epoxy coated.
- E. Tension Control Assemblies: ASTM F1852; Type 1, heavy hex head, twist off type; complete with washers and heavy hex nuts.
 - 1. Finish: Mechanically galvanized.
- F. Shear Connectors: ASTM A108; headed, unfinished and in accordance with AWS D1.1; Type B.
- G. Anchor Rods: ASTM F1554; Grade 55, weldable.
- H. Threaded Rods: ASTM A36/A36M.
 - 1. Finish: Mechanically galvanized.

2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.
- B. Shop and Touch-Up Primer: Tan epoxy paint.

2.5 FABRICATION

- A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

- B. Fabricate connections for bolt, nut, and washer connectors.

2.6 FINISH

- A. All exposed structural steel elements shall be primed and painted with two coats of tan epoxy exterior grade paint.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Shop test bolted and welded connections as specified for field quality control tests.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify bearing surfaces are at correct elevation.
- B. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

- A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components and shear connectors indicated on Drawings.
- C. Do not field cut or alter structural members without approval of Engineer.
- D. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

- A. Grout under base plates in accordance with Section 03 60 00 – Grout.
- B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.
- C. Moist cure grout.
- D. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.
- E. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 FIELD QUALITY CONTROL

- A. Bolted Connections: Inspect in accordance with AISC specifications.
 - 1. Visually inspect all bolted connections.
 - 2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

- B. Welding:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Visually inspect all welds.
 - 3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.

- C. Correct defective bolted connections and welds.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes wall, and roof framing; built-up structural members; shop fabricated trusses; wall and roof sheathing; preservative and fire retardant treatment, sill gaskets, flashings; and roof curbs and cants; blocking in wall and roof openings; wood furring and grounds; electrical panel back boards, concealed wood blocking.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate framing system, loads and cambers, bearing details, and framed openings.
- B. Manufacturer's catalogs showing rough hardware conforming to or equivalent to hardware shown.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by NIST PS 20.
 - 2. Plywood Grading Agency: Certified by APA/The Engineered Wood Association.
- B. Conform to IBC for loads, seismic zoning and other governing load criteria unless more stringent requirements are contained in these specifications or shown in the Drawings.
- C. Prefabricated wood trusses shall be designed by or under the direct supervision of a Professional Engineer registered in the State of New Mexico and experienced in the structural design of wood trusses of the type used in this project.
- D. Standard framing and spacing shall be used per applicable code requirements.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: Lumber shall be graded in accordance with the "Standard Grading and Dressing Rules No. 16", of the West Coast Lumber Inspection Bureau (WCLIB) or in accordance with "Grading Rules for Western Lumber", published by Western Wood Products Association, as specified herein.
- B. Grade Marking: Each piece of lumber shall bear the official grade mark of recognized grading agencies, using one of the above-mentioned grading rules.

- C. Size Dressing: All lumber, except as otherwise shown or specified herein, shall be dressed to size in accordance with the standards of the association under which the lumber is graded. All lumber shall be S4S unless otherwise shown.
- D. Drying: All lumber incorporated in the work, except where otherwise specified, shall be air or kiln dried to a moisture content of not more than 19% and not less than 1%.
- E. All wood nailing blocks, sills and plates resting on or embedded in concrete or masonry within 18-inches of grade shall be pressure-treated in accordance with American Wood Preservers' Association Manual of Recommended Practice, Standard for Preservative Treatment by Pressure Process-All Timber Products, Cl. Preservative shall conform to American Wood Preservers Assn. and American Wood Preserves Bureau Standard Specifications referenced in Paragraph entitled, "References Specifications, Codes and Standards". Creosote shall not be used.
- F. Wherever necessary to cut, notch, dap, drill or frame treated lumber, newly cut or bored surfaces shall be treated with two heavy coats of the same preservative used in the original treatment. The minimum penetration depth shall be 1/4-inch.

2.2 SHEATHING MATERIALS

- A. Plywood Roof and Wall Sheathing: Plywood shall conform to the requirements of U. S. Product Standard PS 1, as specified herein. All plywood panels shall be marked with grade mark of the American Plywood Association. The mark shall identify the plywood as to species, glue type and grade in compliance with the applicable commercial standard. Except as otherwise specified below or shown, plywood shall be Douglas Fir, Exterior, C-D, SIS.
- B. Telephone and Electrical Panel Boards: Plywood.

2.3 SHOP FABRICATED TRUSSES

- A. Except where more restrictive requirements are shown on the Drawings, listed below or contained in the local building code, metal-plate-connected wood roof trusses are to be designed in accordance with the applicable provisions of the latest edition or revision of "Design Specification for Metal-Plate-Connected Wood Trusses", published by the Truss Plate Institute.
- B. Manufacturers:
 - 1. J.D. Adams Company
 - 2. Alpine Engineered Products, Inc.
 - 3. Gang-Nail Systems, Inc.
 - 4. Hydro-Air Engineering, Inc.
 - 5. Substitutions: Permitted if approved by Engineer.
- C. Design Roof Live and Dead Load: 15 psf (10 psf when uplift live loads are applied), with deflection limited to 1/240.

- D. Design Floor Live and Dead Load: +20 psf, -23 psf (uplift), with deflection limited to 1/360.
- E. Truss Type: Plate connected.
- F. Verify dimensions and site conditions prior to fabrication.
- G. Fabricate steel connector plates to size, configuration and thickness required to properly transfer member loads.
- H. Cut members accurately to length to achieve tight joint connections.
- I. Jig trusses during fabrication to assure accurate configuration.
- J. Press connectors into lumber, both sides of joint simultaneously.

2.4 ACCESSORIES

- A. Fasteners: Galvanized steel for exterior, high humidity, and treated wood locations, plain finish elsewhere.
- B. Die Stamped Connectors: Minimum 20 gauge (0.036 inches thick), galvanized steel.
- C. Structural Framing Connectors: Galvanized steel, sized to suit framing conditions.
- D. Rough Hardware: The term "rough hardware" shall include nails, screws, lag screws, bolts, nuts, washers, plates, metal fasteners and framing anchors; anchor bolts which are to be embedded into concrete, concrete masonry or brick masonry; and similar items employed in erection and construction of the rough carpentry work. Rough hardware shall be of standard manufacture, approved by a recognized agency for the intended applications and shall be provided with laboratory test results on capabilities when requested by the Engineer. All hardware items shall be steel unless specified or shown otherwise.
- E. Building Paper: ASTM D226 No. 15 asphalt felt.

PART 3 EXECUTION

3.1 FRAMING

- A. Erect wood framing members in accordance with applicable code. Place members level and plumb. Place horizontal members crown side up.
- B. Rough carpentry shall be as shown, specified and as necessary to complete work. The Contractor shall verify drawing dimensions with actual field conditions and shall inspect related work and adjacent surfaces and shall report to the Engineer all conditions that could prevent proper execution of this work.

- C. Timber connectors and installation thereof shall conform to applicable requirements of AITC 104 and AITC 105 of the Timber Construction Manual of the American Institute of Timber Construction.
- D. Strength Considerations: Structural wood framing member shall not be spliced between bearing points or supports. Place framing so that structural and other important members do not require cutting for openings, pipes, vents, conduits or ducts. Bearing surfaces on which wood structural members are to rest shall be finished to give full, true and even support. Wedges or shims shall not be used to correct faulty work. Wood members, which have been split or otherwise damaged to such an extent as to impair their strength, shall be removed and replaced. Members shall not be cut, notched nor bored more than 1/4 of their depth without adequate and approved reinforcing.
- E. Blocking and Backing: All blocking and backing in walls and ceilings shall be nominal 2-inch thick material of a depth as needed and shall be accurately located around light fixtures, ceiling register, grilles and other required mechanical and electrical items. The blocking shall fit snugly and shall be spiked into the supporting framing members. Wood blocking (backing) to receive sheathing, siding, metal lath and gypsum board shall be provided wherever necessary for securing the facing materials.
- F. Place full width continuous termite shield and sill flashing on foundations.
- G. Place sill gasket directly on sill flashing.
- H. Frame double joist headers at ceiling openings. Frame rigidly into joists. Frame double joists under wall studding.
- I. Bridge framing in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.
- J. Curb roof openings except where curbs are provided. Construct curb members of single pieces for each side.

3.2 SHEATHING

- A. Secure wall sheathing with ends staggered, over firm bearing.
- B. Place building paper over wall sheathing, weather lap joints and end laps, staple in place.
- C. Install electrical panel backboards with plywood sheathing material where required. Size backboard by 12 inches beyond size of electrical panel.

3.3 SHOP FABRICATED TRUSSES

- A. Verify that supports and openings are ready to receive trusses.
- B. Verify that sufficient end bearing area exists.

- C. Install trusses in accordance with the applicable provisions of "Commentary and Recommendations for Handling and Erecting Wood Trusses" of the Truss Plate Institute.
- D. After trusses have been placed leveled, aligned and plumbed and temporary bracing is in place, reset, in accordance with manufacturer's directions, any connection plates that may have been loosened.
- E. Bracing:
 - 1. Before applying any superimposed loads, place permanent bridging, bracing and anchors.
 - 2. Unless other bracing is shown on the Drawings, provide bracing in accordance with the applicable provisions of "Bracing Wood Trusses: Commentary and Recommendations" of the Truss Plate Institute.
- F. Do not field-cut trusses or remove any truss members.
- G. Place headers and supports to frame openings required.
- H. If, in the opinion of the Engineer, any damaged trusses cannot be satisfactorily repaired, the damaged trusses shall be removed from the project and replaced with trusses acceptable to the Engineer.

3.4 SITE APPLIED WOOD TREATMENT

- A. Treat site-sawn cuts. Brush applies two coats of preservative treatment on untreated wood in contact with cementitious materials and roofing and related metal flashings.
- B. Allow preservative to cure prior to erecting members.

PART 4 MEASUREMENT AND PAYMENT

- 4.1 The work covered in this section for each item shall be considered incidental to the cost of their respective bid item.

END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal roof panels, and all necessary accessories for a complete installation.

1.02 RELATED SECTIONS

- A. Related sections include the following:
 - 1. Division 01, General Requirements.
 - 2. Section 09 90 00, Painting and Coating.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - b. C1311, Standard Specification for Solvent Release Sealants.
 - c. D523, Standard Test Method for Specular Gloss.
 - d. D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
 - e. D4214, Standard test methods for evaluating the degree of chalking of exterior paint films.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - g. E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
 - h. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - i. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 - j. E903, Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
 - i. E1646, Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

- j. E1680, Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
- 2. FM (Factory Mutual) Global (FMG):
 - a. Approval Guide.
 - b. 4471, Approval Standard for Class 1 Panel Roofs.
- 3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Architectural Sheet Metal Manual.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements for Roofing System:

- 1. Air Infiltration:
 - a. Air leakage through assembly of not more than 0.06 cfm/square foot of roof area when tested in accordance with ASTM E1680 at the following test pressures:
 - 1) Test Pressure:
 - a) Roof Slope Less Than or Equal to 30 Degrees: Negative 1.57 lbf/square feet.
 - 2) Preload Test-Pressure Difference:
 - a) Positive: Greater than or equal to 15 lbf/square feet and the greater of 75 percent of building live load or 50 percent of building design positive wind pressure difference.
 - b) Negative: 50 percent of design wind uplift pressure difference.
 - b. Water Penetration:
 - 1) No water penetration when tested in accordance to ASTM E1646 at the following test pressures:
 - a) Test Pressure:
 - (1) Roof Slope Less Than or Equal to 30 Degrees: 2.86 lbf/square feet.
 - b) Preload Test-Pressure Difference:
 - (1) Positive: Greater than or equal to 15 lbf/square feet and the greater of 75 percent of building live load or 50 percent of building design positive wind pressure difference.
 - (2) Negative: 50 percent of design wind uplift pressure difference.
 - c. Structural Performance:
 - 1) Provide metal roof panel assemblies capable of withstanding the design loads provided in General Structural Notes on Drawings.
 - d. Thermal Movement: Provide metal roof panel assemblies that allow for thermal movement resulting from temperature change of 120 degrees F (67

degrees C), ambient and 180 degrees F (100 degrees C), material surface.

1.05 SUBMITTALS

A. Action Submittals:

1. Product Data for each metal panel system including manufacturer's color chart for full range of available colors for selection by Owner.
2. Shop Drawings: Drawings showing thickness and dimensions of parts and accessories, fastening and anchoring methods, details, and locations of seams, joints, hold-down clips and other provisions for thermal movement. Distinguish between factory-assembled and field-assembled work. Include drawings at not less than 1/4-inch to 1-foot scale and details at not less than 3-inch to 1-foot scale.
 - a. Submit project specific details that demonstrate compliance with design documents.
3. Samples: 12-inch square Samples of specified metal based on initial color selections from color chart(s). Samples will be reviewed for color and texture only.
4. Delegated-Design Submittal: Demonstrate metal roof and wall panels comply with performance requirements and design criteria.
 - a. Comprehensive analysis of design loads, including dead loads, live loads, wind loads, and thermal movement. Refer to Section 01 88 15, Anchorage and Bracing and loads provided in General Structural Notes on Drawings.
 - b. Wind uplift calculations and analysis data in conformance with ASCE 7.

B. Informational Submittals:

1. Manufacturer's printed installation instructions.
2. Underlayment product information and approval from metal roofing manufacturer.
3. A letter from roofing manufacturer stating roofer is approved by manufacturer to apply the roof.
4. Product Test Reports: For each product, for tests performed by a qualified testing agency.
5. Special guarantee.

1.06 QUALITY ASSURANCE

- A. Applicator's Qualifications: Approved and trained by materials manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver components and metal roof panels so as not to be damaged or deformed. Package for protection during transportation and handling.
- B. Storage and Handling:
 1. Protect against damage and discoloration.

2. Handle panels with nonmarring slings.
3. Do not bend panels.
4. Store panels aboveground on pallets or platforms, with one end elevated for drainage.
5. Protect strippable protective covering from exposure to sunlight except as necessary for metal roof installation.
6. Stack panels to prevent twisting, bending, or abrasion, and to provide ventilation.
7. Protect panels against standing water and condensation between adjacent surfaces.
8. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and separate sheets for air-drying.
9. During storage, prevent contact with materials that may cause discoloration or staining. Store sheet metal roofing materials away from uncured concrete and masonry.

1.08 COORDINATION

- A. Coordinate metal roofing layout and seams with sizes and locations of roof curbs, equipment supports, equipment provided, and roof penetration.
- B. Coordinate metal roofing installation with rain drainage work, flashing, trim, and construction of roofing substrate, parapets, walls, and other adjoining work to provide leak-proof, secure, and noncorrosive installation.

1.09 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the Contract Documents.
- B. Special Warranty: At the option of the Owner, the Installer agrees to repair or replace components of metal roofing panels that fail in materials or workmanship within the specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failure including, but not limited to, rupturing, cracking, or puncturing.
 - b. Wrinkling or buckling.
 - c. Loose parts.
 - d. Failure to remain weathertight, including uncontrolled water leakage.
 - e. Galvanic action between sheet metal roofing and dissimilar materials.
 2. Warranty Period. Two years from date of Substantial Completion.
- C. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of finish to adhere to bare metal.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal roofing system including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing, fascia panels, trim, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Metal roofing system shall remain watertight.
- B. Air Infiltration:
 1. Air leakage through assembly of not more than 0.06 cfm/square foot of roof area when tested in accordance with ASTM E1680 at the following test pressures:
 - a. Test Pressure:
 - 1) Roof Slope Less Than or Equal to 30 Degrees: Negative 1.57 lbf/square feet.
 - b. Preload Test-Pressure Difference:
 - 1) Positive: Greater than or equal to 15 lbf/square feet and the greater of 75 percent of building live load or 50 percent of building design positive wind pressure difference.
 - 2) Negative: 50 percent of design wind uplift pressure difference.
- C. Water Penetration:
 1. No water penetration when tested in accordance to ASTM E1646 at the following test pressures:
 - a. Test Pressure:
 - 1) Roof Slope Less Than or Equal to 30 Degrees.
2.86 lbf/square feet.
 - b. Preload Test-Pressure Difference:
 - 1) Positive: Greater than or equal to 15 lbf/square feet and the greater of 75 percent of building live load or 50 percent of building design positive wind pressure difference.
 - 2) Negative: 50 percent of design wind uplift pressure difference.

- D. Structural Performance:
 - a. Provide metal roof panel assemblies capable of withstanding the design loads provided in General Structural Notes on Drawings.
- E. Thermal Movement: Provide metal roof panel assemblies that allow for thermal movement resulting from temperature change of 120 degrees F (67 degrees C), ambient and 180 degrees F (100 degrees C), material surface.

2.02 METAL ROOFING PANELS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Prefinished galvalume coated steel sheet with galvalume coating consisting of made of 55 percent aluminum, 1.6 percent silicon, and balance of zinc as described in ASTM A792, 22-gauge minimum.
- C. Surface: Smooth, flat finish.
- D. Finish: Premium fluoropolymer coating system; minimum 70 percent Kynar 500, 1.0-mil minimum total dry film thickness.
- E. Color: To be selected by Owner.

2.03 MISCELANEOUS MATERIALS AND ACCESSORIES

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary metal roofing panel manufacturer unless otherwise indicated.
- B. Underlayment of type approved by metal roofing manufacturer.
- C. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal by means of plastic caps or factory-applied coating. Fasteners must be of adequate length for attachment to roof deck.
 - 1. Fasteners for Roof Panels: Self-drilling or self-tapping zinc-plated, hex-head carbon steel screws with stainless steel cap or zinc-aluminum alloy head with EPDM or PVC washer.
 - 2. Fasteners for Flashing and Trim: Self-drilling screws with hex washer head or blind fastener rivets of high-strength aluminum or stainless steel.
- D. Flashing, Trim, and Miscellaneous Pieces: Same metal and finish as roofing panels in minimum 20-gauge thickness, and in shapes and dimensions as shown on Drawings.
- E. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- F. Closures: Manufacturer's standard neoprene blocks shaped to fit metal panel profiles.
- G. Sealants:
 - 1. Joint Sealant: Type 5 as specified in Section 07 92 01, Joint Sealants, or

as required by panel manufacturer.

2. Silicone Sealant: Type 1 as specified in Section 07 92 01, Joint Sealants, or as required by panel manufacturer.
 3. Tape Sealant: Type 13 as specified in Section 07 92 01, Joint Sealants, or as required by panel manufacturer.
 4. Butyl Sealant: Butyl-rubber based, solvent-release sealant per ASTM C1311.
 5. Volatile Organic Compound (VOC) content limit of 250 grams per liter in accordance with South Coast Air Quality Management District Rule 1168.
- H. Isolation Paint: As specified in Section 09 90 00, Painting and Coating.

2.04 FABRICATION

- A. Provide panel profile, including major ribs and any intermediate stiffening ribs for full panel length.
- B. Panel Length: Metal Roof panels shall be full length from eave to ridge, unless otherwise indicated.
- C. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal- to-metal contact.
- D. Conceal fasteners and methods of expansion where possible. Do not use exposed fasteners on faces of accessories where exposed to view.
- E. Finishes:
 1. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 2. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half the range of approved sample. Noticeable variations within same piece are not acceptable. Variations in other component appearances are acceptable if within range of approved samples and are assembled or installed to minimize contrast.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with alignment tolerances required by standing seam metal roof panel manufacturer.
- B. Prior to beginning installation, examine rough-in location for items penetrating metal roof panels and coordinate with seam locations. Locate roof penetrations to avoid panel seams.

3.02 PREPARATION

- A. Roof Substrate: Firm, dry, free of foreign materials, and smooth. Report immediately to Design-Builder cracks, breaks, holes, or other unusual

irregularities in surface that would prevent proper installation.

- B. Coordinate Work of this section with flashing, trim, and other construction to provide a permanently leakproof, secure, and noncorroding installation.
- C. Layout Pattern: Lay out panels to place seams equidistant from ends of roofs.

3.03 INSTALLATION

A. General:

- 1. Apply metal roof panels only in dry weather and where weather conditions permit.
- 2. Install in accordance with manufacturer's written instructions and warranty requirements.
- 3. Comply with recommendations of the SMACNA "Architectural Sheet Metal Manual."
- 4. Install metal roofing consisting of nonstructural sheet metal panels held to substrate with concealed fasteners.
- 5. Closures and Trim:
 - a. Provide exposed trim and flashing for a weather-tight roofing and soffit system.
 - b. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of openings. Fasten with self-tapping screws.
- 6. Dissimilar Metals:
 - a. Separate from each other where electrolysis might occur.
 - b. Separate metal panels where contact with corrosive substrates may occur.
 - c. Separation is satisfactorily accomplished by coating metals with isolation Paint.
 - d. Comply with various metals producers' recommendations for other forms of protection against contamination from corrosive materials or agents.
- 7. Cutting and Fitting: Neat, square, and true. Saw cut panels, deburr, and use touchup paint immediately as recommended by roofing panel manufacturer. Torch cutting is prohibited.

B. Metal Roofing Panels:

- 1. Underlayment:
 - a. Install underlayment on rigid roof insulation as shown on Drawings, unless otherwise recommended by metal roof panel manufacturer.
 - b. Install no more underlayment than can be covered by metal roofing or other approved protection, in same day.

- c. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal roof panels.
2. Roof Panels:
 - a. Begin at eaves. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction.
 - b. Install clips in panel side joints at location, spacing, and with fasteners as recommended by manufacturer for type of substrate.
 - c. At intersections of roof slope with peak, turn up edges of roof panel 1 inch.
 - d. Cross Seams: Not allowed. Provide full-length from eave to peak.
 - e. Edges:
 - 1) Extend gutter flashing under metal roofing 6 inches minimum and terminate in 3/4-inch folded edge secured by cleats.
 - 2) Hook lower end of roofing into lock strip to form 3/4" wide loose-lock seam.

3.04 CLEANING AND PROTECTION

- A. Cleaning:
 1. At the end of each day sweep metal clean of foreign materials, especially metal particles, and scrap.
 2. Peel off strippable film.
 3. Where needed, clean metals in conformance with manufacturer recommendations.
 - a. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
 - b. Clean off excess sealants.
- B. Protection:
 1. Protect material from exposure to chlorides, hydrochloric-based and muriatic acids. If contaminated, wash affected areas immediately with 5 percent soda and water solution and rinse with clear water.
- C. Final Repair and Cleanup:
 1. Remove debris, metal clips, nails, and other materials that could prevent adequate drainage or produce corrosion products through electrolysis.
 2. Repair and touch up damage.
 3. Repair and touch up damage. Repair minor scratches with matching coating recommended by the panel manufacturer. Replace metal roofing panels, trim and flashing that have been damaged or have deteriorated beyond successful repair.

END OF SECTION

SECTION 08 11 13
STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Sections include steel doors, panels and frames.

1.2 SUBMITTALS

- A. Product Data: Submit door and frame configurations, location of cut-outs for hardware reinforcement.
- B. Samples: Submit two samples of metal, door frame and door face illustrating shop finish colors and surface texture.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
1. ANSI 250.8 - Recommended Specifications for Standard Steel Doors and Frames.
 2. DHI - Door Hardware Institute - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 3. Fire Rated Doors, Panels and Frames:
 - a. Product Construction: NFPA 252.
 - b. Product Installation: NFPA 80.

PART 2 PRODUCTS

2.1 STEEL DOORS AND FRAMES

- A. Manufacturers:
1. Amweld Building Products, Inc.
 2. Ceco Door Products.
 3. SW Fleming Limited.
 4. Habersham Metal Products.
 5. Kewanee Corp.
 6. Steelcraft.
 7. Substitutions: Permitted.
- B. Product Description: Standard shop fabricated steel doors, and frames; fire rated and non-rated types; flush face or stile and rail design.

2.2 COMPONENTS

- A. Exterior Doors (Insulated): ANSI A250.8, 1-3/4 inch thick.

1. Level 1 - Standard Duty, Model 2, seamless design.
- B. Exterior Frames:
 1. Level 1 for Door Models, nominal 18 gage/0.042 inch thick material, base metal thickness.
- C. Door Core: Polystyrene foam.
- D. End Closure: Channel, 0.04 inch thick, flush.
- E. Thermal Insulated Door: Total insulation R-Value of 7, measured in accordance with ASTM C1363.

2.3 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape. Primer: ANSI A250.10 rust inhibitive type.
- B. Heavy Duty Hinges: ANSI A156.1, full mortise type, complying with following general requirements unless otherwise scheduled.
 1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
 2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
 - a. Fire Rated Doors to 86 inches High: Minimum three hinges.
 - b. Residential Hollow Core Wood Doors: Furnish minimum two hinges.
 3. Size and Weight: 4-1/2 inch heavy weight typical for 1-3/4 inch doors.
 - a. Doors over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
 - b. Doors 1-3/8 inch Thick: 3-1/2 inch size.
 - c. Doors 2 inch Thick: 5 inch extra heavy weight ball or oilite bearing.
 - d. Doors over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
 4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
- C. View Windows: Wire-meshed glass.
- D. Weatherstripping: Resilient vinyl set in aluminum retainer.

2.4 FABRICATION

- A. Fabricate doors and frames with hardware reinforcement welded in place.
- B. Attach astragal to one inactive leaf of pairs of fire rated doors.
- C. Configure exterior frames and doors with profile to receive recessed weatherstripping.
- D. Fabricate frames as face welded units.
- E. Fabricate frames to suit masonry wall coursing with 4 inches head member.

- F. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- G. Prepare interior frames for silencers and install.
- H. Frame Mullions for Double Doors: Removable type, with profile matching jambs.
- I. Frame Transom Bars: Fixed type, with profile matching jamb and head.
- J. Attach fire rating label to each fire rated door and frame.

2.5 FINISHING

- A. Steel Sheet: Shop finished galvanized to ASTM A653/A653M A40.
- B. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
 - 1. Hinges:
 - a. BHMA 630 and 626, satin finish.
 - 2. Typical Exterior Exposed and High Use Interior Door Hardware:
 - a. BHMA 630, satin finished stainless steel.
 - 3. Typical Interior Door Hardware:
 - a. BHMA 626, satin chromium plated brass or bronze.
 - 4. Thresholds: Finish appearance to match door hardware on exterior face of door.
 - a. BHMA 628, satin aluminum, clear anodized.
 - 5. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.
- C. Door Hardware: Refer to Section 08 71 00.
 - 1. All Doors shall be equipped with Mortise Lock Exterior Classroom handles with Panic Hardware on the interior side of door.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install doors and frames in accordance with ANSI A250.8.
- B. Coordinate door frames with masonry wall construction for frame anchor placement.
- C. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

- D. Install door louvers plumb and level.
- E. Coordinate installation of glass and glazing.
- F. Finish/Coating:
 - 1. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.
 - 2. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - 3. Door manufacturer shall provide finish powder coating of the surfaces of the door prior to shipment, per coating manufacturer's instructions, color to be selected by Owner.
- G. Adjust door for smooth and balanced door movement.
- H. Tolerances:
 - 1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.3 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit adjacent work to damage hardware or hardware finish.

3.4 SCHEDULE

- A. As indicated on Drawings.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hardware for steel doors.
 - 1. Provide door gaskets, including weatherstripping and seals, and thresholds.
- B. Related Sections:
 - 1. Section 08 11 13 Steel Doors and Frames

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A156.1 - Butts and Hinges.
 - 2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
 - 3. ANSI A156.3 - Exit Devices.
 - 4. ANSI A156.4 - Door Controls - Closures.
 - 5. ANSI A156.5 - Auxiliary Locks and Associated Products.
 - 6. ANSI A156.6 - Architectural Door Trim.
 - 7. ANSI A156.7 - Template Hinge Dimensions.
 - 8. ANSI A156.8 - Door Controls - Overhead Holders.
 - 9. ANSI A156.12 - Interconnected Locks and Latches.
 - 10. ANSI A156.13 - Mortise Locks and Latches.
 - 11. ANSI A156.14 - Sliding and Folding Door Hardware.
 - 12. ANSI A156.15 - Closer Holder Release Devices.
 - 13. ANSI A156.16 - Auxiliary Hardware.
 - 14. ANSI A156.18 - Materials and Finishes
 - 15. ANSI A156.19 - Power Assist and Low Energy Power Operated Doors.
 - 16. ANSI A156.23 - Electromagnetic Locks.
 - 17. ANSI A156.24 - Delayed Egress Locks.
 - 18. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.
- B. Builders Hardware Manufacturers Association:
 - 1. BHMA Directory of Certified Products.
- C. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 305 - Panic Hardware.
 - 3. UL - Building Materials Directory.

- E. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.

1.3 PERFORMANCE REQUIREMENTS

- A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.
 - 1. Hardware: Tested in accordance with NFPA 252.

1.4 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts.
 - 2. Submit manufacturer's parts lists.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 00 00 - Execution Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 00 00 - Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.7 COORDINATION

- A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
 - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- B. Sequence installation to accommodate required utility connections.
- C. Coordinate Owner's keying requirements during course of Work.

1.8 WARRANTY

- A. Furnish five year manufacturer warranty for locksets and door closers.

PART 2 PRODUCTS

2.1 DOOR HARDWARE

- A. Manufacturers:
 - 1. Bommer Industries, Inc.
 - 2. Hager Companies.
 - 3. Substitutions: Permitted.
- B. Lockset Manufacturers:
 - 1. Yale.
 - 2. Hager Companies
 - 3. Substitutions: Permitted.
- C. Closers Manufacturers:
 - 1. Yale.
 - 2. Norton.
 - 3. Substitutions: Permitted.

2.2 COMPONENTS

- A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
 - 1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
 - 2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
 - 3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
 - a. Finish: Match hardware item being fastened.
 - 4. Fire Ratings: Provide hardware with UL or Intertek Testing Services (Warnock Hersey Listed) listings for type of application involved.
 - 5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.
- B. Hinges: ANSI A156.1, full mortise type, complying with following general requirements unless otherwise scheduled.
 - 1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
 - 2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
 - a. Fire Rated Doors to 86 inches High: Minimum three hinges.
 - b. Residential Hollow Core Wood Doors: Furnish minimum two hinges.

3. Size and Weight: 4-1/2 inch heavy weight typical for 1-3/4 inch doors.
 - a. Doors over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
 - b. Doors 1-3/8 inch Thick: 3-1/2 inch size.
 - c. Doors 2 inch Thick: 5 inch extra heavy weight ball or oilite bearing.
 - d. Doors over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
 4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
- C. Pivots: ANSI A156.1, center pivots.
1. Size: As recommended by pivot manufacturer for size and weight of door.
- D. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
1. Mortise Locksets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
- E. Latch Sets: Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
1. Mortise Latch Sets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
 2. Bored (Cylindrical) Latch Sets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
- F. Exit Devices: ANSI A156.3, Grade 1 concealed vertical rod type, with cross bar, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt, with dust-proof floor strikes.
1. Types: Suitable for doors requiring exit devices.
 2. Coordinators: Furnish overhead concealed in frame type at pairs of doors.
 3. Covers: Stainless Steel
- G. Cylinders: ANSI A156.5, Grade 1, pin type removable mortise cylinders.
1. Keying: Key to existing keying system.
- H. Closers: ANSI A156.4 modern type with cover closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
 2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
 3. Location: Mount closers on inside of exterior doors.
 4. Operating Pressure: Maximum operating pressure as follows.
 - a. Exterior Doors: Maximum 8.5 pound.
 - b. Fire Rated Doors: As required for fire rating, maximum 15 pounds.
- I. Door Controls and Overhead Holders: Furnish with accessories as required for complete operational installation.

1. Manual Door Holders and Overhead Stops: ANSI A156.8, Grade 1 types as specified

2.3 ACCESSORIES

- A. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
 1. Do not use through bolts on solid wood core doors.

2.4 FINISHING

- A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
 1. Hinges:
 - a. BHMA 630 and 626, satin finish.
 2. Typical Exterior Exposed and High Use Interior Door Hardware:
 - a. BHMA 630, satin finished stainless steel.
 3. Typical Interior Door Hardware:
 - a. BHMA 626, satin chromium plated brass or bronze.
 4. Closers: Finish appearance to match door hardware on same face of door.
 - a. BHMA 628, satin aluminum, clear anodized.
 5. Thresholds: Finish appearance to match door hardware on exterior face of door.
 - a. BHMA 628, satin aluminum, clear anodized.
 6. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as instructed by manufacturer.

3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Mounting Heights from Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
 1. Locksets: 38 inch.
 2. Push/Pulls: 42 inch.
 3. Dead Locks: 48 inch.
 4. Push Pad Type Exit Devices: 42 inch.
 5. Cross Bar Type Exit Devices: 38 inch.

6. Top Hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
7. Bottom Hinge: Jamb manufacturer's standard, but not greater than 12-1/2 inches from floor to center line of hinge.
8. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
9. Hinge Mortise on Door Leaf: 1/4 inch to 5/16 inch from stop side of door.

3.3 ADJUSTING

- A. Adjust hardware for smooth operation.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit adjacent work to damage hardware or hardware finish.

3.5 SCHEDULES

- A. Hardware Set 1: Fire rated.
 1. Hinges: Full mortise hinges as specified.
 2. Exterior Lock: Mortise lock, Classroom Function.
 3. Exit Device: Grade 1 Mortise lock, Panic Exit Device, Heavy-duty push pad
 4. Closer: Surface mounted as specified.
 5. Kickplate: 16 inch high, push side only.
 6. Gaskets: Fire and smoke rated gaskets as specified.
 7. Floor Stop: Dome type as specified.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes gypsum board with joint treatment; predecorated gypsum board; metal stud wall framing; metal channel ceiling framing; and acoustic insulation.

1.2 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Manufacturers:
 - 1. Celotex Building Products.
 - 2. G-P Gypsum Corp.
 - 3. National Gypsum Co.
 - 4. United States Gypsum Co.
 - 5. Substitutions: Permitted.

2.2 COMPONENTS

- A. Studs and Tracks: ASTM C645; galvanized sheet steel, 0.018 inch thick, C shape, with knurled faces.
- B. Furring, Framing, and Accessories: ASTM C645.
- C. Gypsum Board Types: 1/2 inch thick, maximum available length in place; ends square cut, tapered edges; unless noted otherwise as follows:
 - 1. Standard Type: ASTM C1396.
 - 2. Fire Rated Type: ASTM C1396, UL or WH rated.
 - 3. Exterior Gypsum Soffit Board: ASTM C1396.
 - 4. Foil Faced Gypsum Board: ASTM C1396.
 - 5. Gypsum Sheathing Board: ASTM C1396/C1396M; moisture resistant and fire resistant.
 - 6. Gypsum Core Board: ASTM C1396, square edges.
 - 7. Cementitious Backing Board: High density, glass fiber reinforced.

2.3 ACCESSORIES

- A. Corner Beads: Metal.

- B. Edge Trim: GA-216, Type LC bead.
- C. Joint Materials: ASTM C475, reinforcing tape, joint compound, adhesive, and water.
- D. Fasteners: ASTM C1002.
- E. Adhesive: ASTM C557.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions are ready to receive work.

3.2 INSTALLATION

- A. Gypsum Board:
 - 1. Install gypsum board in accordance with GA-216.
 - 2. Fasten gypsum board to furring or framing with nails or screws. Staples may only be used when securing first layer of double layer applications.
 - 3. Place control joints consistent with lines of building spaces.
 - 4. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
 - 5. Install moisture resistant type gypsum board at minimum first 4 vertical feet of all interior walls of pump house.
 - 6. Seal cut edges and holes in moisture resistant gypsum board with sealant.
- B. Joint Treatment:
 - 1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 2. Feather coats onto adjoining surfaces so camber is maximum 1/32 inch.
- C. Tolerances: Maximum Variation from Flat Surface: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 13 34 19

PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes pre-engineered, shop-fabricated, structural steel building frame; insulated metal wall and sloped roof system including soffits, gutters and downspouts, and roof mounted equipment curbs; and exterior doors, skylights, overhead doors, and louvers.
- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods.

1.2 REFERENCES

- A. American Institute of Steel Construction:
 - 1. AISC 360
 - 2. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
 - 3. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings.
 - 4. AISC S344L - Metric Load and Resistance Factor Design Specification for Structural Steel Buildings.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 6. ASTM A490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
 - 7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 8. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - 9. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 - 10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - 11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

12. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 13. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 14. ASTM C991 - Standard Specification for Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings.
 15. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Metal Building Manufacturers Association:
1. MBMA - Low Rise Building Systems Manual.
- E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- F. Underwriters Laboratories Inc.:
1. UL - Building Materials Directory.
- G. International Building Code:
1. IBC - Current Edition.
- H. Steel Deck Institute:
1. SDI - Diaphragm Design Manual

1.3 SYSTEM DESCRIPTION

- A. Metal Building System Description: Rigid clear span nonexpandable endwalls, primary frame and endwall columns.
1. Eave Height: As required to provide clear height indicated on Drawings.
 2. Dimensions and Bay Spacings: As indicated on Drawings] [As required to provide clear dimensions indicated on Drawings.
 3. Roof Slope: 1 inch per 12 inches (1:12)
- B. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
 2. Design Loads: As indicated in Drawings.
- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

- D. Comply with AISC's "Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings"; and AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members."

1.4 DESIGN REQUIREMENTS

- A. Thermal resistance of Installed Wall System: R-Value of 19.
- B. Thermal Resistance of Installed Roof System: R-Value of 30.
- C. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- D. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.5 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for submission of design calculations, reviewed shop and erection drawings, as required for acquiring permits.
- B. Cooperate with regulatory agency or authority and provide data as requested authority having jurisdiction.
- C. Provide components of each type from one manufacturer compatible with adjacent materials.
- D. Coordinate all mechanical chase sizes with the mechanical contractor.
- E. Coordinate with mechanical and electrical contractors' size and location of equipment as shown on plans.

1.6 SUBMITTALS

- A. Section 01 00 00 - General Requirements: Submittal procedures.
- B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method or installation; framing anchor bolt settings, sizes, and locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide seal and signature of professional engineer in the state where Project is located.
- C. Manufacturer's Instructions: Submit preparation requirements, anchor bolt placement, and all other standard information provided by the manufacturer. All loading criteria pertaining

to the building superstructure shall be certified by the manufacturer of the pre-engineered metal building system and shall be so noted on the shop drawings submittals.

- D. Submit letter of design certification, signed and sealed by a qualified professional engineer. Indicate name and location of Project, name of manufacturer, order number, name of contractor, governing building code and standards including year of edition, design loads and load combinations, building use category, and load importance factors.
- E. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 00 00 - General Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of concealed components and utilities.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with AISC S335, AISC S342L, AISC S344L, and MBMA Low Rise Building Systems Manual.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Erector: Company specializing in performing Work of this section approved by manufacturer.
- C. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.10 PRE-INSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing work of this section.

1.11 WARRANTY

- A. Furnish five-year manufacturer warranty for pre-engineered building systems and components.

PART 2 PRODUCTS

2.1 PRE-ENGINEERED BUILDINGS

- A. Manufacturers:

1. Butler Manufacturing Co.
 2. Clovis Metal Buildings, Inc.
 3. Lester Building Systems
 4. Trachte Building Systems, Inc.
 5. Varco-Pruden Buildings
 6. Substitutions: Section 01 00 00 - Product Requirements.
- B. Furnish materials in accordance with State of New Mexico Public Works Standards.
- C. Structural-Framing Materials:
1. W-Shapes: ASTM A992/A 992M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
 3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
 4. Steel Pipe: ASTM A53/A 53M, Type E or S, Grade B.
 5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), or High-Strength Low Alloy Steel (HSLAS); or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), or High-Strength Low Alloy Steel (HSLAS).
 7. Metallic-Coated Steel Sheet: ASTM A653/A653M, Structural Steel (SS) or High-Strength Low Alloy Steel (HSLAS); with G60 coating designation; mill phosphatized.
 8. Steel Joists and Joist Girders: Comply with SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders," with steel-angle top and bottom chord members.
- D. Roof and Wall Panels:
1. Metal Panels: Steel sheet, zinc coated by the hot-dip process, complying with ASTM A653/A653M, G90, Structural Steel (SS), and prepainted by the coil-coating process to comply with ASTM A755/A 755M.
 2. Lap-Seam Roof Panels: Metal panels factory formed to provide 36-inch coverage, with raised trapezoidal major ribs at 12 inches o.c., and intermediate stiffening ribs symmetrically spaced between major ribs. Design panels for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges.
 3. Roof Panel Metal Thickness: 26 Gauge.
 4. Lap-Seam Wall Panels: Metal panels factory formed to provide 36-inch coverage, with raised trapezoidal major ribs at 12 inches o.c., and intermediate stiffening ribs symmetrically spaced between major ribs. Design panels for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges.
 5. Wall Panel Metal Thickness: 26 Gauge.
 6. Metal Panel Finish: Siliconized-polyester system consisting of epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

7. Translucent Panels: Glass-fiber-reinforced polyester, complying with ASTM D3841, Type CC1, limited flammability, Grade 1; weather resistant, weighing 8 oz./sq. ft. for roof panels and 6 oz./sq. ft. for wall panels.
 8. Panel Accessories: Provide clips, flashings, sealants, gaskets, and similar items. Where roof panels attach directly to purlins, provide 1-inch-thick, extruded-polystyrene thermal spacer blocks.
- E. Flashing and Trim: Form from 0.0159-inch-thick, zinc-coated (galvanized) steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim same as adjacent roof or wall panels.
- F. Gutters and Downspouts: Form from 0.0159-inch-thick, zinc-coated (galvanized) steel sheet prepainted with coil coating. Match gutters to profile of gable trim and finish gutters to match roof fascia and rake trim. Finish downspouts to match wall panels.
- G. Metal Building Insulation: ASTM C991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch-wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.
1. Vapor-Retarder Facing: Fiber-reinforced white polypropylene or vinyl film complying with ASTM C1136.
- H. Accessories:
1. Personnel Doors: Steel doors, 1-3/4 inches thick, with 0.0329-inch-thick, zinc-coated (galvanized) steel face sheets, 0.0528-inch-thick, inverted channels welded to face sheets at top and bottom of door, and polystyrene foam core; and steel frames, with 2-inch-wide faces, fabricated from 0.0528-inch-thick, zinc-coated (galvanized) steel sheet. Prepare and reinforce doors and frames to receive hardware according to DHI A115 Series.
 2. Overhead Coiling Doors: Provide, metal trimmed openings; doors are specified in Division 08 Section "Overhead Coiling Doors."
- I. Miscellaneous Materials:
1. Primer: SSPC-Paint 15, Type I, red oxide.
 2. Grout: ASTM C1107, factory-packaged, nonmetallic grout, noncorrosive, and nonstaining.
 3. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; of manufacturer's standard size.
 4. Joint Sealant: ASTM C920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - General Requirements: Coordination and project conditions.
- B. Verify foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

3.2 ERECTION

- A. Setting Base and Bearing Plates: Clean concrete and masonry of bond-reducing materials and roughen surfaces before setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed.
 - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- B. Erect framing true to line, level, plumb, rigid, and secure. Comply with AISC specifications referenced in this Section.
 - 1. Make field connections for primary framing using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," snug tightened or pretensioned.
 - 2. Fasten secondary framing to primary framing using clips and non-high-strength bolts. Hold rigidly to a straight line by sag rods.
 - 3. Install joists, girders, and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders."
 - 4. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
 - 5. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- C. Roof Panel Installation: Provide roof panels of full length from eave to ridge when possible.
 - 1. Install screws with power tools having controlled torque to compress neoprene washer without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - 2. Use aluminum or stainless-steel fasteners for exterior and galvanized fasteners for interior.
 - 3. Locate panel splices over, but not attached to, structural supports; stagger panel splices.
 - 4. Lap-Seam Roof Panels: Fasten to purlins with exposed fasteners at each lapped joint. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on lap seams. At splices, lap panels 6 inches, seal with butyl sealant and fasten together with interlocking clamping plates.

- D. **Wall Panel Installation:** Provide panels full height of building unless otherwise indicated.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints.
 2. When 2 rows of panels are required, lap panels 4 inches minimum. Locate panel splices over structural supports.
 3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
 4. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing.
 5. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on lap seams.
 6. Install screws with power tools having controlled torque to compress neoprene washer without damage to washer, screw threads, or panels. Install screws in pre-drilled holes.
 7. Use aluminum or stainless-steel fasteners for exterior and galvanized fasteners for interior.
- E. **Insulation Installation:** Install insulation concurrently with panel installation. Set vapor-retarder-faced units with vapor retarder to warm side of construction. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
1. **Over-Framing Installation:** Extend over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.
 2. **Between-Purlin Installation:** Extend between purlins. Carry facing up and over purlin, overlapping adjoining facing. Hold in place with bands and crossbands below insulation.
 3. **Over-Purlin-with-Spacer-Block Installation:** Extend over and perpendicular to top flange of secondary framing members. Install layer of unfaced insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.
 4. **Two-Layers-between-Purlin-with-Spacer-Block Installation:** Extend between purlins. Carry facing up and over purlin, overlapping adjoining facing. Install layer of unfaced insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
- F. **Accessory Installation:**
1. Seal perimeter of door louver frames with elastomeric sealant used for panels.
 2. Install personnel doors and frames straight, level, and plumb. Securely anchor frames to building structure. Set units with maximum 1/8-inch clearance between door and frame at jambs and head and maximum 3/4-inch clearance between door and floor.
 3. **Pipe Flashing:** Form flashing around pipe penetrations. Fasten and seal to panels.
 4. Adjust and check each operating item of hardware to ensure proper operation and function. Replace units that cannot be adjusted to operate freely and smoothly.
- G. **Gutters, Downspouts, Flashing, and Trim Installation:** Comply with SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion; conceal fasteners

where possible, and set units true to line and level. Install work with laps and seams that will be permanently watertight.

END OF SECTION

SECTION 22 11 00

PUMP HOUSE PLUMBING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water Piping.
 - 2. Unions and flanges.
 - 3. Gate valves.
 - 4. Ball valves.
 - 5. Check valves.
 - 6. Air Valves
 - 7. Pipe supports.
 - 8. Sleeves.
 - 9. Mechanical Seals
 - 10. Water pressure gauges.
 - 11. Master meters.
 - 12. Hose bibs and sample cocks.
 - 13. Backflow preventers.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods: Execution requirements for placement of concrete specified by this section.
 - 2. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
 - 3. Section 31 23 23 - Backfill: Requirements for backfill to be placed by this section.
 - 4. Section 33 11 00 - Water Utility Distribution Piping: Product and execution requirements for underground water piping.
 - 5. Section 33 12 19 - Hydrants.
 - 6. Section 33 13 00 - Disinfection of Water Distribution: Product and execution requirements for disinfection of water piping.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
 - 4. ASME B31.9 - Building Services Piping.

- B. American Society of Sanitary Engineering (ASSE):
 - 1. ASSE 1010 - Performance Requirements for Water Hammer Arresters.
 - 2. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.
 - 3. ASSE 1012 - Performance Requirements for Backflow Preventer with Intermediate Atmospheric Vent.

4. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
 5. ASSE 1019 - Performance Requirements for Wall Hydrants, Freezeless, Automatic Draining, AntiBackflow Types.
- C. American Society for Testing and Materials International (ASTM):
1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 2. ASTM A536 - Standard Specification for Ductile Iron Castings.
 3. ASTM B32 - Standard Specification for Solder Metal.
 4. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
 5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 6. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
 7. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 8. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 9. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameters.
 10. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 11. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
 12. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 13. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 14. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 15. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 16. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
 17. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
 18. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
 19. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 20. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
- D. American Water Works Association (AWWA):
1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.

3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
 4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 6. AWWA C651 - Disinfecting Water Mains.
 7. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
 8. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
 9. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
 10. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 2. MSS SP 67 - Butterfly Valves.
 3. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
 4. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
 5. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 6. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
 7. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
 8. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
 9. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
 10. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
 2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
 3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
 4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
- C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 00 00 - Execution Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of valves and equipment.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 00 00 - Product Requirements: Product storage and handling requirements.
- B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Galvanized Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, epoxy-coated, threaded ends.
 - 1. Fittings: ASTM A234/A234M galvanized carbon steel, threaded.
- B. Stainless Steel Pipe: AWWA C220, Schedule 40 pipe, 304L stainless steel, unless otherwise identified on the Drawings or on the Bid Form, for all stainless steel pipe greater than 4" diameter shall be welded conforming to ASTM A312, for pipe 3" and smaller shall be NPT threaded conforming to ANSI B1.20.1.
 - 1. Fittings: AWWA C226, Stainless Steel Schedule 40 fittings shall be SS304 Class 150, conforming to MSS SP-114 with a CWP of 300 psi. Threads shall meet ANSI B1.20.1.
- C. Steel Pipe: ASTM A53/A53M Schedule 40, grooved ends.
 - 1. Fittings: ASTM B16.3, Schedule 40 fittings shall be Pressure Class 150, with a CWP of 300 psi. 3" and smaller shall be NPT threaded conforming to ANSI B1.20.1.

2.2 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:

1. Stainless Steel Piping: Class 150, stainless steel Type 304, three piece.
2. Steel Pipe: Class 150, ASTM A197, three piece
3. Dielectric Connections: Union with galvanized or plated steel threaded end, brass threaded end, water impervious isolation barrier.

- B. Flanges for Pipe 2-1/2 inches and Larger:
1. Stainless Steel Piping: Class 150, threaded flange adapters.
 2. Gaskets: 1/16-inch-thick preformed neoprene gaskets.

2.3 GATE VALVES

- A. Manufacturers:
1. Crane Valve, North America.
 2. Hammond Valve.
 3. Milwaukee Valve.
 4. Mueller Valve.
 5. NIBCO, Inc.
 6. Stockham Valves & Fittings.
 7. Substitutions: Section 01 00 00 - Product Requirements.
- B. 2 inches and Smaller: MSS SP 80, Class 150, bronze body, bronze trim, threaded union bonnet, non-rising stem, lock-shield stem hand-wheel, inside screw with back-seating stem, solid split wedge disc, alloy seat rings, solder or threaded ends.

2.4 BALL VALVES

- A. Manufacturers:
1. Milwaukee Valve.
 2. Apollo
 3. Red White Valve Corp.
 4. Stockham
 5. Substitutions: Section 01 00 00 - Product Requirements.
- B. All ball valves 2-inch or smaller shall be stainless steel.
- C. May be imported or domestic.
- D. Working Pressure: Not less than 350 psi.
- E. Inlet/Outlet: NPT, or as shown on Drawings.
- F. All stainless steel construction, including body, tailpiece, ball, ball retainer, stem, handle, handle nut, packing nut, and lock washer.
- G. Valve shall be actuated manually using lever-type handle, one-quarter turn to open and close. Handle length and range of motion shall allow handle to be located in most accessible location without interference with any other object.

2.5 SILENT CHECK VALVES

- A. Manufacturers:
 - 1. Val-Matic, Series #1400, 2”.
 - 2. Approved equal.
 - 3. Substitutions: Section 01 00 00 - Product Requirements.
- B. The Check Valve shall be of the silent operating type that begins to close as the forward flow diminishes and is fully closed at zero velocity.
- C. The valve body shall be constructed of ASTM A126 Class B cast iron.
- D. The seat and disc shall be ASTM B584 Alloy C87600 cast bronze.
- E. The compression spring shall be ASTM A313 Type 316 stainless steel with ground ends.
- F. The exterior of the valve shall be coated with a universal alkyd primer.

2.6 AIR RELEASE VALVE

- 1. Manufacturer:
 - a. Val-Matic Valve and Manufacturing Corporation, Model # 15A.3DISVH
 - b. Or approved equal
 - c. Substitutions: Section 01 00 00 - Product Requirements.
- 2. Working pressure: 175 psi
- 3. Inlet: 1” NPT
- 4. Outlet: ½” NPT
- 5. Cast iron or ductile iron body, cover and baffle; stainless steel trim, float, and fasteners.
- 6. Seat: Resilient Buna N.
- 7. Internal and external coatings shall be fusion bonded epoxy conforming to NSF-61 requirements.

2.7 PIPE SUPPORTS

- A. Manufacturers:
 - 1. CCI Piping Systems
 - 2. Empire Industries, Inc.
 - 3. Superior Valve Co.
 - 4. Substitutions: Section 01 00 00 - Product Requirements.
- B. Vertical Support: Steel riser clamp.
- C. Floor Support for Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.8 SLEEVES

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage thick galvanized steel.

- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge thick galvanized steel.

2.9 MECHANICAL SEALS

- A. Manufacturer:
 - 1. Maddock Industries
 - 2. Flexicraft Industries
 - 3. Substitutions: Refer to 01 00 00 Substitutions
- B. Link Seal
 - 1. EPDM Seal
 - a. Suitable for direct ground burial, normal atmospheric conditions
 - b. Nuts and Bolts: Stainless Steel

2.10 WATER PRESSURE GAUGES

- A. Manufacturers:
 - 1. Winters Instruments.
 - 2. WIKA.
 - 3. Ashcroft.
 - 4. Approved equal.
 - 5. Substitutions: Section 01 00 00 - Product Requirements.
- B. Must conform to ANSI B40.1 and have the following characteristics:
 - 1. Liquid filled, altitude/psi process gauge.
 - 2. Stainless steel isolation ball valve.
 - 3. Accuracy: 0.5% of full scale.
 - 4. Wetted materials: 316 SS.
 - 5. Case material: Polypropylene; safety glass window.
 - 6. Connection: 1/4" NPT(M), bottom.
 - 7. Dial Size: 4-1/2".
 - 8. Mounting: Stem or surface.
 - 9. Range: 0-160 psi, 0-370 feet.

2.11 POSITIVE DISPLACEMENT MASTER METERS

- A. Manufacturers:
 - 1. Badger Model 55 Bronze
 - 2. Substitutions: Section 01 00 00 - Product Requirements.
- B. Furnish materials in accordance with most recent edition of New Mexico Public Works Standards, with latest revisions.
- C. Meter will consist of magnetic drive for measurement of cold water, with flow in one direction only, bronze case, hermetically sealed register, and must comply with AWWA C701 and have remote reading capability to AWWA C706.
- D. Meter: Brass body turbine meter with magnetic drive register.

1. Service: Cold water.
2. Operating Range: Continuous flow: 1-55 gpm, Maximum Continuous Operation: 40 gpm
3. Maximum Operating Pressure: 150 psi.
4. Accuracy: Within 1-1/2 percent of actual throughput.
5. Pipe Size: 1 inch.

2.12 HOSE BIBS AND SAMPLE COCKS

- A. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc with smooth nose spout, chrome plated where exposed with hand wheel lock shield and removable key.

2.13 HYDRANTS

- A. Hydrants: Conform to Section 33 12 19.

2.14 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventers:
 1. Manufacturers:
 - a. Zurn Model 375
 - b. Substitutions: Section 01 00 00 – Product Requirements
 2. Comply with ASSE 1013.
 3. Comply with AWWA C511
 4. Housing shall be reinforced nylon, with Delrin internal parts and stainless steel springs, struts, and fasteners.
 5. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two quarter-turn ball valves, and four test cocks.

2.15 PIPE INSULATION

- A. Manufacturers:
 1. Aeroflex, USA
 2. Substitutions: Section 01 00 00 – Product Requirements
- B. Closed-cell EPDM (Ethylene Propylene Diene Monomer)-based rubber elastomeric foam pipe insulation for plumbing piping.
- C. Suitable for interior and exterior applications
- D. R-Value: Minimum 5.8 for 2 inch IPS pipe.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - PIPE SUPPORTS

- A. Install in accordance with ASTM F708.
- B. Support horizontal piping as scheduled.

3.4 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1-inch above finished floor level. Caulk sleeves.
- E. Floor Penetrations: Seal with mechanical seals as specified.

3.5 INSTALLATION - ABOVE GROUND PIPING

- A. Install non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- C. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange systems to drain at low points.

- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not accessible.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- L. Install domestic water piping in accordance with ASME B31.9.
- M. Sleeve pipes passing through partitions, walls and floors.
- N. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.
- O. Install unions downstream of valves and at equipment or apparatus connections.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- R. Install gate ball valves for shut-off and to isolate equipment, part of systems, or vertical risers, if applicable.
- S. Install globe ball valves for throttling, bypass, or manual flow control services, if applicable.
- T. Provide lug end valves adjacent to equipment when functioning to isolate equipment.
- U. Provide spring loaded check valves on discharge of water pumps, if applicable.
- V. Provide flow controls in water circulating systems as indicated on Drawings, if applicable.
- W. Install potable water protection devices on plumbing lines where contamination of domestic water may occur.
- X. Pipe relief from valves, back-flow preventers and drains to nearest floor drain with air gap.

3.6 CLEANING

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.
- C. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.
- D. Maintain disinfectant in system for 24 hours.
- E. When final disinfectant residual tests less than 25 mg/L, repeat treatment.
- F. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.
- G. Take samples no sooner than 24 hours after flushing and analyze in accordance with AWWA C651.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating subsoil.
 - 2. Cutting, grading, filling, rough contouring, and compacting site for site structures and building pads.
- B. Related Sections:
 - 1. Section 31 10 00 - Site Clearing: Excavating topsoil.
 - 2. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
 - 3. Section 31 23 23 - Backfill: General building area backfilling.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. The following payment concepts only apply when a corresponding item is included in the Bid Schedule. If no specific item is provided, then this work shall be considered incidental to those items which require grading.
- B. Topsoil Fill:
 - 1. Basis of Payment: Includes excavating existing soil, supplying soil materials, stockpiling, scarifying substrate surface, placing where required, and compacting.
- C. Subsoil Fill:
 - 1. Basis of Payment: Includes excavating existing subsoil, supplying subsoil materials, stockpiling, scarifying substrate surface, placing where required, and compacting.
- D. Structural Fill:
 - 1. Basis of Payment: Includes excavating existing subsoil, supplying structural fill materials, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

- A. Geotechnical Report
 - 1. Geo-Test, Inc., "Geotechnical Engineering Services Report No. 1-30804, Sandoval County Fire Station 41 Tank Relocation Project, Placitas, New Mexico," September 19, 2023
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

- C. American Society for Testing and Materials International (ASTM):
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 2. ASTM D422 - Particle -Size Analysis of Soils.
 3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.
 4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft³.
 5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
 6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft³.
 8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.
 9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 11. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 12. ASTM D2434 - Standard Test Method for Permeability of Granular Soils Constant Head.
 13. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
 14. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).
 15. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
 16. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
 17. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 18. ASTM D4254 - Minimum Index Density and Unit Weight of Sols and Calculation of Relative Density.
 19. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 20. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
 21. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
 22. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
 23. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
 24. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
 25. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
 26. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
 27. ASTM D5080 - Rapid Determination of Percent Compaction.

28. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures.
- B. Samples: Submit, in airtight containers, 10 lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.
- B. Perform Work in accordance with applicable New Mexico State Standards.

PART 2 PRODUCTS

2.1 MATERIALS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Quality Requirements: Examination of existing conditions before starting work.
- B. Verify survey benchmark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call New Mexico "One Call" at 811 and local utility companies at least three (3) days before performing Work.
 1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect remaining utilities from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.
- G. Notify Owner of any utility damage at once so emergency measures can be taken. The Contractor will pay for any required repairs.
- H. Intercept and divert surface drainage and precipitation away from excavation through use of dikes, curb walls, ditches, pipes, or other means.
- I. Remove and exclude water, including storm water, groundwater, irrigation water, and/or other waters, from all excavations. Dewatering wells, well-points, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level below the bottom of excavations. Water shall be removed and excluded until backfilling is complete and all field soils testing have been completed.
- J. Comply with New Mexico state standards and requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
- K. Excavation below Fills and Embankments: The subgrade areas beneath embankments shall be excavated to remove not less than the top 1 foot of native material and, where such subgrade is sloped, the native material shall be benched. After the required excavation or over-excavation has been completed, the top 12 inches of material shall be scarified and moisture added or material dried to optimum moisture and the exposed surface shall be proof rolled.

- L. Excavation under areas to be paved shall extend to the bottom of the sub-base. After the required excavation has been completed, the area shall be scarified a minimum of 12 inches below the subgrade surface and recompact prior to the placement of the sub-base aggregate and/or base course aggregate. The finished sub-grade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.
- M. Material beyond prescribed lines which is loosened by the Contractor's operations shall be removed, replaced and/or compacted, as directed by the Engineer, at no additional cost to the Owner.

3.4 FILLING

- A. See Section 31 23 23 - Backfill.

3.5 DISPOSAL OF EXCAVATED MATERIALS

- A. Excess excavated material or excavated material not suitable for backfill may be disposed of on-site, provided that:
 - 1. The finished grade substantially conforms with the Drawings, or any deviation therefrom is approved by the Engineer.
 - a. Blend with natural terrain.
 - b. Minimum slope: 2%.
 - c. Maximum slope: 4:1.
 - 2. All excess excavated material spread on the right-of-way is compacted to the same specifications as final backfill, as set for in Section 31 23 23 - Backfill and the Drawings, and
 - 3. All on-site disposal of material is approved by the Engineer.
- B. Do not dispose of waste material by dumping from tops of slopes.
- C. Do not dispose of excess material within 15 feet of any wash, drainage or waterway.

3.6 TOLERANCES

- A. Section 01 00 00 - Quality Requirements: Tolerances.
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.7 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557, ASTM D698, AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D6938.
 - 2. Moisture Tests: ASTM D6938.

- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Compaction testing shall be done to the extent such that the Owner and Engineer can be reasonably assured that the backfill has been placed in accordance with the requirements of the Contract Documents or in accordance with the NMDOT Standard Specifications for Road and Bridge Construction, whichever is the more stringent. When a testing allowance is established on the Bid Form, the Owner and Engineer will determine the testing frequency to be used throughout the project.

3.8 SCHEDULES

- A. Not used.

END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating trenches for utilities.
 - 2. Compacted fill from top of utility bedding to finished grade.
 - 3. Backfilling and compaction.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods: Concrete materials.
 - 2. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
 - 3. Section 31 23 23 - Backfill: General backfilling.
 - 4. Section 33 11 00 - Water Utility Distribution Piping.

1.2 REFERENCES

- A. Geotechnical Report
 - 1. Geo-Test, Inc., "Geotechnical Engineering Services Report No. 1-30804, Sandoval County Fire Station 41 Tank Relocation Project, Placitas, New Mexico," September 19, 2023

- B. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
 - 1. NMSSPWC Sections 701, 801 & 802 "Trenching, Excavation and Backfill".

- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

- D. American Society for Testing and Materials International (ASTM):
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D422 - Particle -Size Analysis of Soils.
 - 3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.
 - 4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - 5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
 - 6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³).
 - 8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.
 - 9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
11. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
12. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).
13. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
14. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
15. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
16. ASTM D4254 - Minimum Index Density and Unit Weight of Sols and Calculation of Relative Density.
17. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
18. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
19. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
20. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
21. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
22. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
23. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
24. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
25. ASTM D5080 - Rapid Determination of Percent Compaction.
26. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.
- B. Materials Source: Submit name of imported fill materials suppliers.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with applicable New Mexico state standards and specifications of the utility provider.
- B. Perform Work in accordance with applicable OSHA trench safety standards.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.6 COORDINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Pipe Bedding and Embedment: As specified in Section 31 23 23.
- B. Pipe Backfill: As specified in Section 31 23 23.
- C. Structural Fill: As specified in Section 31 23 23.
- D. Granular Fill: As specified in Section 31 23 23.
- E. Concrete: Structural concrete, as specified in Section 03 05 00, with minimum compressive strength of 4,000 psi. Concrete for thrust blocking with minimum compressive strength of 3,000 psi.

PART 3 EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

3.2 PREPARATION

- A. Call New Mexico "One Call" at 811 and local utilities not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns and other features remaining as portion of final landscaping.
- D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 LINES, GRADES AND DIMENSIONS

- A. Excavate trench to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required based on field conditions.
 - 2. Deviations from horizontal and vertical pipe line and grade by Contractor per Section 33 11 00 - Water Utility Distribution Piping.
 - 3. When bottom of trench is rocky, over-excavate and fill as specified in Section 31 23 23.

- B. Excavate trench to minimum width as indicated on Drawings.
 - 1. Cut trenches to width indicated on Drawings, providing at least 6 inches of clear space between the trench face and the outside diameter of the pipe. The maximum permissible width of the trench shall be the outside diameter of the pipe (or distance between pipes plus pipe diameters in the event that two pipes are buried in the same trench) plus 24 inches, unless otherwise indicated on the Drawings, permission in writing to use a greater width is obtained from the Engineer.
 - 2. Increase trench width as required to meet required clearances between pipe and trench wall, to avoid voids in the haunch areas of the pipe and to meet embedment compaction requirements.
 - 3. Increased trench width, if needed to meet these requirements, shall be provided at no additional cost to the Owner.

3.4 TRENCHING

- A. Excavate subsoil required for utilities.

- B. Remove lumped subsoil, boulders, and rock up to the size that would require special equipment beyond conventional machinery used for trenching, in which case the Engineer should be notified immediately.

- C. Allowable Open Trench: Trenches may be opened in advance of pipe placement and backfill operations under the following conditions:
 - 1. In developed areas and along traveled roadways, no more than 100 feet of trench shall be opened in advance of pipe laying operations. This distance may be reduced due to traffic control considerations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. In undeveloped areas outside of roadway rights-of-way and away from any vehicular or pedestrian traffic, open trench shall not be advanced more than 500 feet ahead of installed pipe. Whenever local, county, state or federal regulations impose stricter limitations, such regulations will take precedence.
 - 2. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by traffic weight steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. In no case shall more than 10 feet of trench be left open at end of working day.
 - 3. Do not block vehicular traffic or impede access to homes or businesses.
 - 4. Protect open trench to protect the public, livestock, wildlife and the environment.

5. Contractor is solely responsible for safety of all open trenches and bears sole liability for any incidents or accidents arising from open trenches.
 6. The Owner may further restrict the amount of open trench as needed due to safety, land use or environmental considerations.
- D. Intercept and divert surface drainage and precipitation away from excavation through use of dikes, curb walls, ditches, pipes, or other means.
- E. Dewater and maintain substantially dry subgrade during pipe installation.
1. Remove groundwater by pumping to keep excavations dry.
 2. Comply with New Mexico state standards and requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
 3. If a separate bid item is not included on the Bid Form for dewatering, the cost thereof will be considered incidental to the cost of trenching and utility installation.
- F. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.
- G. Do not interfere with 45 degree bearing splay of foundations. Any excavation in this area shall be backfilled and compacted using the same materials and methods as structural fill for new buildings. Refer to Section 31 23 23.
- H. Slope or shore trench as needed to meet safety requirements. When sidewalls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered. Backfill and compact to reach specified or directed line and grade. Refer to specifications for overexcavation backfill, as set forth in Section 31 23 23.
- J. Cut out soft areas of subgrade not capable of compaction in place. Backfill and compact to specified or directed line and grade. Refer to specifications for overexcavation backfill, as set forth in Section 31 23 23.
- K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- L. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.
- M. Remove excess subsoil not intended for reuse, from site.
- N. Protect open trench at all times to prevent danger to the public and to wildlife. Any safety requirements imposed by agencies or entities with jurisdiction must be met.

3.5 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

- C. Design sheeting and shoring to be removed at completion of excavation work. If the Engineer orders the sheeting to be left in place for the protection of the work, a payment will be allowed only for the actual cost of the timber left in place.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.6 BACKFILLING OF TRENCHES

- A. See Section 31 23 23 - Backfill, Articles 3.3 and 3.4 for general backfill requirements, as well as trench backfill and bedding requirements around pipelines.

3.7 DISPOSAL OF EXCAVATED MATERIALS

- A. Excess excavated material or excavated material not suitable for backfill may be disposed of on-site, provided that:
 - 1. The finished grade substantially conforms with the Drawings, or any deviation therefrom is approved by the Engineer
 - a. Blend with natural terrain.
 - b. Minimum slope: 2%.
 - c. Maximum slope: 4:1.
 - 2. All excess excavated material spread on the right-of-way is compacted to the same specifications as final backfill, as set forth in Section 31 23 23 - Backfill and the Drawings, and
 - 3. All on-site disposal of material is approved by the Engineer.
- B. Do not dispose of waste material by dumping from tops of slopes.
- C. Do not dispose of excess material within 15 feet of any wash, drainage or waterway.

3.8 TOLERANCES

- A. Section 01 00 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.9 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Testing, adjusting, and balancing.
- B. Determine compaction characteristics of materials in accordance with ASTM D698.
- C. Classify soils in accordance with ASTM D2487.
- D. Perform laboratory material tests in accordance with ASTM D1557.

- E. Refer to compaction testing requirements in Section 31 22 13 - Rough Grading and/or Section 31 23 23 - Backfill, Field Quality Control, as applicable.

3.10 PROTECTION OF FINISHED WORK

- A. Section 01 00 00 - Execution Requirements: Protecting installed construction.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 18

ROCK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing identified and discovered rock during excavation.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Disposal of excavated materials.
 - 2. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
 - 3. Section 31 23 23 - Backfill: Backfill materials.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Site Rock Removal:
 - 1. Basis of Measurement: By cubic yard measured after fragmentation
 - 2. Basis of Payment: Includes preparation of rock for removal, mechanical fragmentation of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.
 - 3. Contractor shall notify Engineer prior to commencement of rock removal work when rock is encountered and specialized equipment will be required, and await approval from Engineer before proceeding.
 - 4. Contractor and Engineer must agree on rock quantity at the end of each day that such work was completed, and both parties must sign off on the quantity on the corresponding daily field report.
- B. Trench Rock Removal:
 - 1. Basis of Measurement: By vertical linear foot (VLF) of trench excavation. Each VLF is measured as horizontal linear foot of trench multiplied by the depth of excavated rock. The depth of the excavated rock may be less than the total trench depth. The width of trench is not a factor in the VLF calculation.
 - 2. Basis of Payment: Includes preparation of rock for removal, mechanical fragmentation of rock, removal from position, loading and removing from trench.
 - a. Payment will not be made for over-excavated work beyond the required bedding depth below invert elevation of pipe as shown on Drawings, nor for replacement materials.
 - b. If native trench rock is processed and used as pipe bedding or backfill material, the cost of such processing will be considered incidental to the cost of trench rock removal.
 - c. If trench rock is hauled away from site and replaced with imported material, the costs of rock hauling and disposal, as well as the costs of obtaining and hauling imported fill material will be considered incidental to the cost of trench rock removal.

- d. The cost of placing and compacting embedment and backfill material, regardless of whether it is native or imported, will be considered incidental to pipeline installation.
3. Contractor shall notify Engineer prior to commencement of rock removal work when rock is encountered and specialized equipment will be required, and await approval from Engineer before proceeding.
4. Contractor and Engineer must agree on rock quantity at the end of each day that such work was completed, and both parties must sign off on the quantity on the corresponding daily field report.
5. Where trench rock removal is required, additional pipe bedding material will be needed, as stipulated in Article 3.4 of Section 31 23 23 - Backfill.

1.3 DEFINITIONS

- A. Rock: Solid mineral material of size that cannot be removed with conventional equipment.
- B. For general excavation, a D-9N Caterpillar tractor with a single shank ripper, or equivalent equipment, is considered conventional equipment, if it can rip at a production rate of at least 300 bank cubic yards per hour.
- C. For trench excavation, a 235C Caterpillar excavator with a medium stick and a rock ripping bucket, or equivalent equipment, is considered conventional equipment, if it can excavate at a production rate of at least 30 bank cubic yards per hour.
- D. If material cannot be excavated by conventional equipment, the Engineer must be immediately notified. The Contractor shall provide performance tests of the specified conventional or equivalent equipment. If the Engineer confirms in writing that the specified conventional equipment cannot perform at the production rates specified, the excavation shall be considered rock excavation.

1.4 SUBMITTALS

- A. Section 01 00 00 - Submittals: Submittal procedures.
- B. Submit type of equipment to be used for rock removal and/or processing.
- C. If processed native rock is to be used for embedment and backfill, submit sieve analyses and other geotechnical data on the processed material, as required in field by Engineer.
 1. Laboratory costs associated with such testing shall be reimbursable under project testing allowance. Other costs, such as sample collection and transport, are not covered under the allowance.
- D. Shop Drawings: Indicate proposed method of intended rock removal method.
- E. Survey Report: Submit survey report on conditions of buildings near locations of rock removal.

1.5 PROJECT CONDITIONS

- A. Conduct survey and document conditions of buildings near locations of rock removal, prior to rock removal, and photograph existing conditions identifying existing irregularities.

1.6 SCHEDULING

- A. Schedule Work to avoid disruption to occupied buildings nearby.
- B. Section 01 00 00 - Administrative Requirements: Coordination.

PART 2 PRODUCTS

2.1 MATERIALS

- A. None

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination.
- B. Verify site conditions and note subsurface irregularities affecting Work of this section.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.3 ROCK REMOVAL BY MECHANICAL METHOD

- A. Excavate and remove rock by mechanical method.
- B. Cut away rock at bottom of excavation to form level bearing.
- C. Remove shaled layers to provide sound and unshattered base for footings.
- D. For utility trenches, excavate to below invert elevation of pipe as shown on Drawings to ensure adequate bedding below pipe, and provide trench width as shown on Drawings to allow for proper embedment compaction or soil cement placement on sides of pipe. Exceptions to minimum trench width will be considered by Engineer if Contractor can demonstrate proper bedding and compaction are provided.
- E. Remove excavated materials from site.

3.4 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Testing, adjusting, and balancing.
- B. Request visual inspection of foundation bearing surfaces by Engineer before installing subsequent work.

END OF SECTION

SECTION 31 23 23

BACKFILL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backfilling building perimeter to subgrade elevations.
 - 2. Backfilling site structures to subgrade elevations.
 - 3. Fill under slabs-on-grade.
 - 4. Fill under paving.
 - 5. Fill for over-excavation.
 - 6. Pipe bedding material.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods: Concrete materials.
 - 2. Section 31 22 13 - Rough Grading: Site filling.
 - 3. Section 31 23 17 - Trenching: Backfilling of utility trenches.
 - 4. Section 31 23 18 - Rock Removal.
 - 5. Section 33 11 00 - Water Utility Distribution Piping.

1.2 REFERENCES

- A. Geotechnical Report
 - 1. Geo-Test, Inc., "Geotechnical Engineering Services Report No. 1-30804, Sandoval County Fire Station 41 Tank Relocation Project, Placitas, New Mexico," September 19, 2023
 - 2. Refer to geotechnical data regarding any issues not specifically addressed in these technical specifications. In the event of any discrepancies or differences in requirements between the geotechnical report and the technical specifications, the more stringent requirement shall apply.

- B. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
 - 1. NMSSPWC Sections 701, 801 & 802 "Trenching, Excavation and Backfill".

- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 3050mm (12-in.) Drop.
 - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

- D. American Society for Testing and Materials International (ASTM):
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D422 - Particle -Size Analysis of Soils.
 - 3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.

4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³, 2,700 kN-m/m³).
8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.
9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
11. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
12. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).
13. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
14. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
15. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
16. ASTM D4254 - Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
17. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
18. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
19. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
20. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
21. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
22. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
23. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
24. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
25. ASTM D5080 - Rapid Determination of Percent Compaction.
26. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Percentage Compaction: Ratio, expressed as percentage, of actual density of material compared with maximum dry density based on Modified Proctor (ASTM D1557).
- B. Optimum Moisture Content: Based on Modified Proctor (ASTM D1557).
- C. Unified Soil Classification System: Based on ASTM D2487.

1.4 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures.
- B. Submit samples and certified test documentation of all materials to be used.
- C. Materials Source: Submit name of imported fill materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- E. Submit field soil test on material in place as backfill and pipe bedding material.
- F. Submit construction drawings with compaction test locations marked and labeled with station, date, test number, depth of test below ground surface, and test result.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Suitable materials may be processed on-site, or may be imported. If imported materials are required to meet the quantity requirements of the project, it will be provided at no additional expense to the Owner, unless a unit price item is included for imported materials on the Bid Form. The following types of materials are defined as suitable where scheduled:

- 1. Type A (three-quarter inch minus aggregate backfill): Crushed rock or gravel, and sand with the gradation requirements below.

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/4-inch	100
No. 4	30 – 50
No.200	0 – 12

- 2. Type B (Class I crushed stone): Manufactured angular, crushed stone, crushed rock, or crushed slag with the following gradation requirements. The material shall have a minimum sand equivalent value of 75.

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/4-inch	100
No. 4	30 – 50
No. 200	0 - 5

- 3. Type C (sand backfill): Sand with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a No. 4 sieve, and a sand equivalent value not less than 30.

- a. This material to be used only when approved by Engineer.

- 4. Type D: (pipe bedding material): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve and not more than 5 percent passing a No. 10 sieve and 1 to 2 percent passing a No. 200 sieve.

- 5. Type E (pea gravel backfill): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve and not more than 10 percent passing a No. 4 sieve.

6. Type F (coarse drain rock): Crushed rock or gravel meeting the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
2-inch	100
1-1/2-inch	90- 100
1-inch	20 – 55
3/4-inch	0 – 15
No. 200	0 – 3

7. Type G (aggregate base, base course) as follows:

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4 inch	80-100
No.4	30-60
No.10	20-45
No. 200	3-10

8. Type H (graded drain rock): Drain rock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4-inch	90 - 100
3/8-inch	40 - 100
No. 4	25 – 40
No. 8	18 – 33
No. 30	5 – 15
No. 50	0 – 7
No. 200	0 – 3

9. Type I Not Used

10. Type J (cement-treated backfill): Material which consists of Type H material, or any mixture of Types B, C, G, and H materials which has been cement-treated so that the cement content of the material is not less than 5 percent by weight when tested in accordance with ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement. The ultimate compressive strength at 28 days shall be not less than 400 psi when tested in accordance with ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.

11. Type K (topsoil): Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

12. Type L (controlled low strength material): Controlled low strength material, also referred to as ‘soil cement slurry’ or ‘flowable fill’ shall meet the following requirements:
- a. Slurry shall have a 7-day compressive strength of not less than 50 psi and not more than 150 psi. The compressive strength shall be determined in accordance with ASTM D4832.
 - b. Typical cement content: 3 to 10 percent by dry weight of soil to obtain specified compressive strength.
 - c. The water-cement ratio of the mix shall not exceed 3.5:1. The water content shall not exceed that required to provide a mix that will flow and can be pumped.
 - d. The consistency of the slurry shall be such that the slurry flows easily into all openings between the pipe and the lower portion of the trench.

13. Type M (aggregate sub-base, structural fill). Well-graded crushed rock or natural gravel meeting the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
4-inch	100
3-inch	95 100
No. 200	3 - 15

- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction or with the requirements of a pipe material manufacturer, the Engineer shall be immediately notified. In case of conflict between types of pipe embedment backfills, the Contractor is to use the agency-specified backfill material if that material provides a greater degree of structural support to the pipe, as determined by the Engineer. In case of conflict between types of trench or final backfill types, the Contractor shall use the agency-specified backfill material if that material provides the greater in-place density after compaction.
- C. Fill and backfill types, including use of native soil, shall be used in accordance with the following provisions. Native soil used for fill and backfill must meet the requirements of the type of material specified below and as shown for the corresponding type of material shown in 2.1.A above.
- 1. Embankment fills shall be constructed of Type M material, as defined herein, or other material approved by the Project Engineer. Drainage structures embankments shall be backfilled with materials used in original construction.
 - 2. Pipe zone backfill shall consist of the following materials for each pipe material listed below. All pipe bedding material shall receive prior approval by the Engineer before use.
 - a. Concrete pipe, shall be provided Type A or B pipe bedding and embedment backfill material, or native material that meets the criteria described below, and is acceptable to the Engineer.
 - b. Plastic pipe shall be provided Type D bedding and embedment zone material, or native material that meets the criteria described below, and is acceptable to the Engineer.

- 1) In trenches where dewatering is required, the pipe bedding material and embankment backfill shall be Type A or B as directed by the Engineer.
- c. Excavated native material will be allowed, provided that it is free draining and contains no organic materials, no rocks larger than 1/2-inch, clods or frozen lumps. A proctor of this material shall be submitted to the Engineer for review and approval before use. If native backfill material is approved, on-site screening may be required by Engineer to remove any rock material larger than 1/2-inch at no additional expense to the Owner. The location of such sites must be coordinated with the Owner.
3. Trench zone backfill for pipelines shall be any of Types A through H backfill materials or any mixture thereof.
4. Final backfill material for pipelines under paved areas shall be Type G backfill material.
5. Final backfill under areas not paved shall be the same material as that used for trench backfill, unless otherwise indicated.
6. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
7. Aggregate base materials under pavements, curb and gutter, and sidewalk shall be Type G material constructed to the thickness indicated.
8. Aggregate sub-base shall be Type M material.
9. Backfill around structures shall be Types A through Type H materials, or any mixture thereof.
10. Under structures where groundwater must be removed to allow placement of concrete, Type F material shall be used. Before the Type F material is placed, filter fabric shall be placed over the exposed foundation. Filter fabric shall be Mirafi 140 N, Mirafi 700X, or equal.
11. Under all other structures, Type G or H material shall be used.
12. Backfill used to replace pipeline trench over-excavation shall be a layer of Type F material with a 6-inch top filter layer of Type E material or filter fabric to prevent migration of fines for wet trench conditions or the same material as used for the pipe zone backfill if the trench conditions are not wet.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 8 inches.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING FOR STRUCTURES, SITE WORK AND APPURTENANCES

- A. Backfill areas to contours and elevations with unfrozen materials as indicated on the Drawings or as directed by the Engineer.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer.
- D. Place material in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 8 inches compacted depth.
 - 2. Structural Fill: Maximum 6 inches compacted depth.
 - 3. Granular Fill: Maximum 6 inches compacted depth.
- E. Employ placement method that does not disturb or damage other work.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Slope grade away from building minimum 6 inches in 10 ft, unless noted otherwise.
- H. Make gradual grade changes. Blend slope into level areas.
- I. Shape and drain embankments and excavations, maintain ditches and drains to provide drainage at all times. Protect graded areas against action of elements prior to acceptance of work, and reestablish grade where settlement or erosion occurs.
- J. Bench hillside slopes or fills to key the embankment. Remove and re-compact a minimum of 12 inches normal to the slope of the hillside or fill as the embankment or fill is brought up in layers.
- K. Under surfaced or paved roads, driveways or parking areas, apply base course at uppermost layer of backfill to same thickness as existing driving surface, or 6 inches, whichever is

greater. If paved, apply pavement patch to thickness equal to or greater than existing pavement.

- L. Remove surplus backfill materials from site.
- M. Leave fill material stockpile areas free of excess fill materials.
- N. Repair or replace remaining items damaged by excavation or filling.

3.4 BACKFILLING OF TRENCHES

- A. Place a minimum of 4 inches of bedding material in pipe trenches to lines and grades indicated on Drawings or as directed by Engineer and compact before pipe is laid. Grade bedding material parallel to bottom of pipe.
- B. Do not place material when either the material or the surface upon which it is to be placed is frozen.
- C. Pipe zone backfill materials shall be manually spread around the pipe so that, when compacted, the pipe zone backfill will provide uniform bearing and side support.
 - 1. Exercise care not to damage pipe or appurtenances when placing embedment material.
 - 2. Maintain optimum moisture content of fill materials to attain required compaction density.
 - 3. Ensure material is placed to equal height on both sides of pipe to avoid unequal loading and possible lateral displacement of the pipe. Elevation difference of embedment between each side of pipe shall not exceed 6 inches.
 - 4. Place material in uniform layers.
 - 5. Work material into pipe haunches to prevent voids and achieve specified compaction under the haunches.
 - 6. No backfilling by machine methods permitted until a minimum of one foot of material has been placed by hand over the top of the pipe.
 - 7. Place material to a compacted depth of 12 inches over the top of the pipe, 15 inches of compacted depth over the top of the pipe in paved or traffic areas, and compacted by hand held compacting tools before other backfilling is done.
- D. If pipe laying operations are interrupted for more than 24 hours, cover pipe laid in the trench with backfill.
- E. When the bottom of the trench is unstable, an additional 4 inches shall be over-excavated and filled with bedding material before pipe is laid.
- F. Where rock is present and where there is concern that settling rocks in the surrounding material may rupture the pipeline, the amount of bedding material below and above the pipe shall be increased. In these cases there will be 8 inches of bedding material below the pipe and 15 inches above, as directed by the Engineer.

- G. When using free-draining crushed rock or gravel for embedment on stretches longer than 300 feet, install trench plugs composed of silty, non-plastic material at 300 foot intervals to impede flow of trench water through the embedment.
- H. Under surfaced or paved roads, driveways or parking areas, apply base course at uppermost layer of backfill to same thickness as existing driving surface, or 6 inches, whichever is greater. If paved, apply pavement patch to thickness equal to or greater than existing pavement.

3.5 COMPACTION

- A. Do not place and compact soil under the following conditions:
 - 1. Ambient air temperature below freezing.
 - 2. Rain that creates puddles in clayey or silty materials.
 - 3. Ice or snow pockets visible in material being placed.
- B. Surface Preparation:
 - 1. Prepare surface so that first compacted lift will be placed on firm, stable base. Compact surface to specified percent compaction, if necessary.
 - 2. For water-retaining compacted fill, scarify and moisten surface to provide satisfactory bonding surface before placing first layer of material to be compacted.
 - 3. Do not place material to be compacted on frozen surface.
- C. Compact material in trenches in layers having approximately the same top elevation on both sides of the pipeline to avoid unequal loading and displacement of the pipe.
- D. Placement:
 - 1. Place soil to be compacted in horizontal layers.
 - 2. Blend materials as needed to ensure compacted fill is homogenous and free from lenses, pockets, streaks, voids, laminations and other imperfections.
- E. Compaction Procedures:
 - 1. Silty or Clayey Material:
 - a. Compact with mechanical impact tampers, tamping rollers, vibrating pad foot rollers, rubber tire rollers or other suitable compaction equipment.
 - b. Uniformly distribute equipment passes.
 - c. Compact in horizontal layers to compacted thickness of 6 inches or less.
 - 2. Cohesionless Free-Draining Material: Compact in horizontal layers to maximum compacted thickness of:
 - a. Tampers and rollers: 6 inches
 - b. Crawler-type tractors, vibrating drum rollers, surface vibrators or similar equipment: 12 inches
 - c. Saturation and internal vibration: Penetrating depth of vibrator.
 - 3. When compacting pipe embedment material, exercise care not to damage the pipe or appurtenances with compaction equipment. Do not apply compaction equipment directly above the pipe.
 - 4. Demonstration: Lift thicknesses may vary depending on equipment and methods. Field adjustments to the specified lift thicknesses may be allowed or required.

Contractor shall demonstrate that proposed equipment and methods will meet required compaction for the proposed lift thickness.

5. Flooding and jetting is not allowed unless specifically approved by the Engineer.
- F. Moisture Content:
1. Optimum moisture content for each soil type, whether native soil or imported material, shall be determined by the Modified Proctor method, ASTM D1557.
 2. Moisture content during compaction shall be no more than 2 percentage points wet or dry of optimum moisture content.
 3. Moisten or aerate material, as necessary, to provide specified moisture content. Add water to soil in increments that will permit moisture content to be uniform and homogenous through each layer after mixing.
 4. Add no more than 2 percent water to fill by sprinkling just prior to compaction when fill is clayey and contains dry clods of clay.
 - a. If clayey soil is more than 2 percent below optimum moisture, pre-conditioning and curing may be required to obtain uniform and homogenous distribution of moisture in clods.
 - b. Use of disks, harrows or rakes may be required to blend moisture prior to placement and compaction.
 5. For cohesionless soils, add water as necessary during compaction, as these soils are free-draining.
- G. Minimum Percent Compaction:
1. Over-excavation: Backfill of over-excavation to specified or directed lines shall be compacted to same percent compaction as embedment material or undisturbed foundation material, whichever is greater. If the in-place compaction of the undisturbed foundation material is greater than 95%, the over-excavation backfill may be compacted to 95%.
 2. Pipe Bedding Material: Place and compact pipe bedding material as indicated on Drawings for given soil classification, pipe wall thickness, and depth of cover. If native material meets grading requirements and is used, compact to 95%.
 3. Initial and Final Backfill: For trenches outside of roads, driveways, parking areas or wash crossings, compact to 90%, or to a density equal to that of the adjacent undisturbed soil, as directed by the Engineer. For trenches within the driving surfaces of roads, driveways or parking areas (both paved and unpaved) or within wash crossings, compact to 95%.
 4. Embankments: Compact to same requirements as Final Backfill.
 5. Under buildings, tanks, slabs and other structures: Compact in accordance with Geotechnical reports provided in Exhibit A
 6. Note that all Percent Compaction values in these Technical Specifications and Drawings are based on Modified Proctor, ASTM D1557, unless otherwise noted.
- H. Soil Cement Slurry may be used in trenches, at Contractor's option and expense, to replace bedding, embedment or backfill materials where it is not practical to reach minimum compaction requirements using select material.
1. If soil cement slurry is to be used in lieu of embedment material, soil cement slurry shall also replace the bedding material. Do not use soil cement slurry for embedment on top of select material bedding.

3.6 TOLERANCES

- A. Section 01 00 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling within Building Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of Backfilling under Paved Areas: Plus or minus 1 inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.
- E. Percent Compaction: Shall meet minimum required compaction as set forth in these specifications
- F. Moisture Content: As set forth in these specifications.

3.7 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Testing, Adjusting, and Balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D6938.
 - 2. Moisture Tests: ASTM D6938.
- D. When tests indicate Work does not meet specified requirements, remove material, replace, compact, and retest.
- E. Provide test trenches and excavations including excavation, trench support, and groundwater removal for the soils testing operations, at the locations and depths required. The cost of all work associated with accessing, preparing, or time delays for testing to be included in the unit price of the applicable pay item being tested.
- F. Compaction testing shall be done to the extent such that the Owner and Engineer can be reasonably assured that the backfill has been placed in accordance with the requirements of the Contract Documents, or as required by the utility for which the trenching is being provided, whichever is the more stringent. When a testing allowance is established on the Bid Form, the Owner and Engineer will determine the testing frequency to be used throughout the project. If no allowance is included, the frequency of testing shall be at least once every 200 linear feet of trenching, or at least once every 50 square feet below structural slabs.
- G. Correction of Substandard Work: All fill and backfill represented by tests that fail to meet compaction, moisture content, soil classification or other specifications shall be uncovered as needed, replaced as needed, re-compacted and re-tested until all specifications are met, at no additional expense to the Owner.
 - 1. Elevations, lines and grades of replaced material, as well as of pipe and other structures resting against such material, shall be re-surveyed at the direction of the

Engineer. Contractor shall correct elevations, lines and grades as needed, at no additional expense to the Owner.

3.8 PROTECTION OF FINISHED WORK

- A. Section 01 00 00 - Execution Requirements: Protecting Installed Construction.
- B. Reshape and re-compact fills subjected to vehicular traffic.

3.9 SCHEDULE

- A. Not used.

END OF SECTION

SECTION 31 37 00
RIPRAP AND ROCK LINING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Riprap placed loose.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading.
 - 2. Section 31 23 23 - Backfill.
 - 3. Section 31 23 17 - Trenching.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Riprap:
 - 1. Basis of Measurement: By Square foot.

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Gradation of rock.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with New Mexico Department of Transportation Standard Specifications for Highway and Bridge Construction, if related to roadway construction or drainage.
- C. Submit representative samples of riprap for testing using the Los Angeles Abrasion Test using ASTM-C131 and for Soundness Testing using ASTM C-88.
 - 1. Loss of aggregate from abrasion test shall not exceed 40 percent. Sample results shall be provided to the Engineer for every 500 cubic yards of riprap delivered to the site.
 - 2. Loss of aggregate for soundness test shall not exceed 15 percent. Sample results shall be provided to the Engineer for every 500 yards of riprap delivered to the site.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Riprap: Irregular shaped rock, 2" inch minimum size, 6" inch maximum size; solid and nonfriable.
- B. Riprap:
 - 1. Irregular shaped rock:
 - a. Minimum size (as measured in the smallest dimension):
 - 1) Wired caged riprap: 4" to 8" (d50=6")
 - 2) Uncaged riprap and rock check dams: 8" to 10"
 - b. Solid and nonfriable.
 - 2. Shall comply with New Mexico [Colorado] Department of Transportation standards, Section 602.
- C. Wire mesh:
 - 1. Non-raveling, hexagonal double-twisted wire mesh, with a diameter of at least 0.087", with 2½" x 3¼" mesh openings.
 - 2. Shall comply with New Mexico Department of Transportation standards, Section 602.
- D. Stakes:
 - 1. 4"x4"x3/8" angle iron, , per New Mexico Department of Transportation standard, Section 602.
 - 2. Lengths per Drawings.
- E. Tie Wire:
 - 1. Galvanized 3.8 mm tie wire.
- F. Geotextile Fabric:
 - 1. Non-woven geotextile.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Do not place riprap over frozen or spongy subgrade surfaces.

3.2 PLACEMENT

- A. Place riprap at culvert pipe ends, at embankment slopes, and as a protective cover as indicated on Drawings.

- B. Filter fabric: Provide non-woven geotextile (filter fabric) Class 1, as per New Mexico Department of Transportation standards, Section 604.
- C. Installed Thickness: Minimum of 12 inch, unless otherwise indicated on the Drawings or as directed in field by Engineer.
- D. Wire enclosure: Where wire enclosure is to be used, enclosure shall consist of 0.087" diameter thickness non-raveling, double-twisted wire mesh forming hexagons material (2 1/2"x3 1/4" mesh openings), anchored in place with 4 ft long 4"x4"x3/8" angle irons at 8' centers.

END OF SECTION

SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for public line including potable water line.
 - 2. Tapping Sleeves, Tees and Valves.
 - 3. Underground and Aboveground Pipe Markers.
 - 4. Bedding and Cover Materials.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods: Thrust restraints.
 - 2. Section 31 23 17 - Trenching: Execution requirements for trenching.
 - 3. Section 31 23 23 - Backfill: Requirements for backfill to be placed.
 - 4. Section 33 12 13 - Water Service Connections: Backflow prevention.
 - 5. Section 33 12 16 - Water Utility Distribution Valves.
 - 6. Section 33 12 19 - Hydrants.
 - 7. Section 33 13 00 - Disinfection of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe and Fittings:
 - 1. Basis of Measurement: By the linear foot.
 - 2. Basis of Payment: Includes trenching, hand trimming excavation, piping and fittings, all valves and appurtenances not listed separately on the Bid Form, bedding, backfill, compaction, tracer wire, detectable warning tape, above ground pipe marker posts, concrete thrust restraints (where applicable), concrete wall anchors (if not separately listed on Bid Form), mechanical joint restraints, connection to public utility water source (if not separately listed on Bid Form). Special excavation methods for trenching in rock or hard soils, rock removal and disposal, and/or imported bedding material, if required to meet the project specifications, shall be considered incidental to the cost of the pipe installation. Soil cement, if used, shall be considered incidental to the cost of the pipe installation.
 - 3. The cost of laboratory testing for water quality and the cost of compaction testing shall be reimbursed from testing allowance to the Contractor, upon submittal of invoices. Work performed by Contractor related to such testing shall be considered incidental and shall not be reimbursable from testing allowance. Work shall be coordinated and directed by Engineer. Should initial test fail, Contractor shall pay for all subsequent testing until the results indicate full compliance with the Contract Documents.
 - 4. The cost of work associated with hydrostatic pressure testing and testing of material welds, etc. shall be considered incidental to related work and not be reimbursed. Work shall be coordinated and directed by Engineer.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- C. American Society for Testing and Materials International (ASTM):
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 5. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 - 6. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 7. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - 8. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
 - 9. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - 10. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - 11. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - 12. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - 13. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
 - 14. ASTM F2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
 - 15. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
 - 16. ASTM F2634 - Standard Test Method for Laboratory Testing of Polyethylene (PE) Butt Fusion Joints using Tensile-Impact Method.
- D. American Water Works Association (AWWA):
 - 1. AWWA C104 - ANSI Standard for Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - 2. AWWA C105 - ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.

3. AWWA C110 - ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. (76 mm through 1,219 mm), for Water.
 4. AWWA C111 - ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. AWWA C115 - ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 6. AWWA C116 - ANSI Standard for Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
 7. AWWA C151 - ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
 8. AWWA C153 - ANSI Standard for Ductile-Iron Compact Fittings for Water Service.
 9. AWWA C200 - Steel Water Pipe 6 In. (150 mm) and Larger.
 10. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.
 11. AWWA C206 - Field Welding of Steel Water Pipe.
 12. AWWA C207 - Steel Pipe Flanges for Waterworks Service - Sizes 4 In. through 144 In. (100 mm through 3,600 mm).
 13. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
 14. AWWA C209 - Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 15. AWWA C213 - Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 16. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtenances.
 17. AWWA C605 - Underground Installation of Polyvinyl Chloride PVC Pressure Pipe and Fittings for Water.
 18. AWWA C606 - Grooved and Shouldered Joints.
 19. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1,500 mm), for Water Distribution.
 20. AWWA C901 - Polyethylene Pressure Pipe and Tubing, 1/2 In. through 3 In. (13 mm through 76 mm), for Water Service.
 21. AWWA C906 - Polyethylene Pressure Pipe and Fittings, 4 In. through 63 In. (100 mm through 1,575 mm), for Water Distribution and Transmission).
- E. Manufacturer's Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joint between Tapping Sleeves and Tapping Valves.
- F. National Fire Protection Agency
1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
- G. National Sanitation Foundation (NSF):
1. NSF-14 - Plastics Piping System Components and Related Materials
 2. NSF-61 - Drinking Water System Components-Health Effects
- H. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
1. NMSSPWC Sections 701, 801 & 802 "Trenching, Excavation and Backfill".

- I. Plastic Pipe Institute (PPI):
 - 1. TR-33 - Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe.
- J. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code

1.4 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pipe materials, pipe fittings and accessories, and testing equipment.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- D. Testing Plan: Contractor must submit proposed testing procedure specific to the project, including identifying filling locations, and equipment to be employed for hydrostatic testing of lines, as well as continuity testing for tracer wire, for approval by Engineer.
- E. Contractor shall submit a joint restraint table for all types of restrained joints to be used for the project based on the manufacturer's specifications and calculations.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 00 00 - Execution Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, connections, thrust restraints, and invert elevations. Refer to paragraph 1.51 of Section 01 00 00.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with these specifications, as well as the most recent edition of New Mexico Standard Specifications for Public Works Construction, with latest revisions. The most stringent requirement shall apply.
- B. All piping, fittings, valves, hydrants and any other potable water system appurtenances shall comply with the "Reduction of Lead in Drinking Water Act", in effect as of 2014, or any subsequent revision thereof.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 00 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Block individual and stockpiled pipe lengths to prevent moving.

- C. Do not place pipe or pipe materials on private property without prior authorization, or in areas obstructing pedestrian or vehicular traffic.
- D. Store polyethylene materials out of sunlight.
- E. Flexible pipe shall be braced as required to maintain roundness of +/- 1% during shipping and handling.
- F. Coated pipe shall be shipped on bunks and secured with nylon belt tie down straps or padded banding over braces, and shall be stored on padded skids or other suitable means to prevent damage to coating.
- G. Coated pipe shall be handled with wide belt slings, padded forks or other means to prevent damage to coating. Chains, cables or other equipment likely to damage coating or pipe shall not be used.
- H. Prior to shipment and again prior to installation, all materials shall be visually inspected for damage, including coatings and surfaces. Any damaged materials shall be repaired to original standards or replaced.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 WATER PIPING AND FITTINGS

- A. Polyvinyl Chloride (PVC): AWWA C900, with Dimension Ratio (DR) of DR18 for pipe 4" in diameter and greater, unless otherwise identified on the Drawings or on the Bid Form; for all PVC pipe with a diameter of 2" and greater but less than 4" diameter; Schedule 40, or as scheduled, for all PVC pipe less than 2" diameter:
 - 1. Fittings: Ductile iron, Compact MJ fittings AWWA C153, on all PVC pipe 4" diameter and greater.
 - a. Interior/Exterior Lining: Bituminous outside coating: AWWA C151, cement-mortar lining: AWWA C104.
 - b. Pressure rating of at least 250 psi.
 - c. Marked with pressure rating, nominal diameter of opening, manufacturers' identification, country where cast, and degree of bend.
 - d. ASTM D1785, Schedule 40, for all PVC pipe less than 4" diameter.
 - 2. Joints: Mechanical conforming to ANSI/AWWA C111/A21.11. Solvent-cement couplings are not permitted on pipe 2" diameter and greater.
 - 3. All gaskets shall be constructed of Nitrile/Buna-N or Viton material when joint is installed within 10 feet of a gas line. Gaskets material(s) shall have chemical resistance for the potential chemical attack within the vicinity of the waterline. Contractor shall submit a Gasket Identification Chart along with the pipe submittal, when applicable.

4. Joint Restraints: “EBAA Iron, Megalug®”, or approved equal, for all pipe 4” diameter and greater, “EBAA Iron, Series 6500 and 7500”, or approved equal, for all pipe from 2” to 3-1/2” diameter, installation and spacing as per manufacturer’s specifications.
 5. All buried metallic components shall be wrapped in 8-mil polyethylene.
- B. Stainless Steel Pipe: AWWA C220, Schedule 40 pipe, 304L stainless steel, unless otherwise identified on the Drawings or on the Bid Form, for all stainless steel pipe greater than 4” diameter shall be welded conforming to ASTM A312, for pipe 3” and smaller shall be NPT threaded conforming to ANSI B1.20.1.
1. Fittings: AWWA C226, Stainless Steel Schedule 40 fittings shall be SS304 Class 150, conforming to MSS SP-114 with a CWP of 300 psi. Threads shall meet ANSI B1.20.1.
- C. Steel Pipe: ASTM A-53, Schedule 40 pipe, unless otherwise identified on the Drawings or on the Bid Form, for all steel pipe greater than 4” diameter shall be welded conforming to AWWA C200, for pipe 3” and smaller shall be NPT threaded conforming to ANSI B1.20.1.
1. Fittings: ASTM A197, Steel Schedule 40 fittings shall be Class 150. Threads shall meet ANSI B1.20.1.

2.2 UNDERGROUND PIPE MARKERS

- A. Furnish materials in accordance with the following, as well as the New Mexico Standard Specifications for Public Works Construction, with latest revisions. The most stringent requirement shall apply.
- B. Tracer Wire: : 12 AWG fully annealed, high carbon 1055 grade, high strength solid copper-clad steel conductor rate at 30 volts, Blue Jacket, Copperhead 1230-HS wire or equal, for underground installation. Break load of 452 lbs.
- C. Detectable Underground Utility Marking Tape: Bright colored, continuously printed, minimum 6 inches wide by 4-mil thick, manufactured for direct burial service, imprinted with "BURIED WATER SERVICE" (or similar wording) in large letters, on blue tape in conformance with APWA color code specifications for underground tape systems. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.
- D. Splice Connectors: Model LV 9500 Blazing Snap-locking waterproof connectors pre-filled with silicone or engineer approved equal.

2.3 ABOVEGROUND PIPE MARKERS

- A. Carsonite marker posts, blue, with Owner-specified decals furnished and installed by the Contractor, as per corresponding detail in the Drawings.

2.4 PIPE SUPPORTS AND ANCHORING

- A. Metal for pipe support brackets: ASTM A123/A123M, galvanized structural steel thoroughly coated with bituminous paint.
- B. Metal tie rods and clamps or lugs: Galvanized steel sized in accordance with NFPA 24 thoroughly coated with bituminous paint.

2.5 BEDDING AND BACKFILL MATERIALS

- A. Bedding: Fill Type as specified in Section 31 23 23.
- B. Soil Backfill from Above Pipe to Finish Grade: Soil Type as specified in Section 31 23 23. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

2.6 BOLTS AND NUTS

- A. Zinc-plated or fluoropolymer coated bolts and nuts shall be used for the installation of pipelines up to 500 mm (20") diameter and shall be carbon steel conforming to ASTM A307, Grade A, unless otherwise indicated on the approved drawings. Bolts and nuts shall have standard ANSI B1.1, Class 2A coarse threads.
- B. Stainless steel bolts and nuts shall be used for the installation of pipelines 600 mm (24") diameter and larger and for submerged flanges. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and Grade 8M for nuts.
- C. All bolt heads and nuts shall be hexagonal, except where special shapes are required. Bolts shall be of such length that not less than 6.4 mm (¼") or more than 12.7 mm (½") shall project past the nut in tightened position.

2.7 ACCESSORIES

- A. Steel rods, bolt, lugs and brackets: ASTM A36/A36M or ASTM A307 carbon steel.
- B. Polyethylene Wrap:
 - 1. Manufacturer:
 - a. Northtown Pipe Protection Products
 - b. Or Engineer Approved Equal
 - c. Substitutions: 01 00 00 Product Substitution.
 - 2. Virgin Polyethylene Film in accordance with AWWA C105
 - 3. Thickness: 8-mil (minimum)
 - 4. Film to bear markings showing the trademark, year of manufacture, type of resin, specification of conformance, applicable pipe sizes and the words "warning corrosion protection-repair any damage".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing utility water main size, location, and invert, are as indicated on Drawings.

3.2 PREPARATION

- A. Pre-Construction Site Photos:
 - 1. If required in the Contract Documents, take photographs or videotape along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench.
 - 2. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing site features that may potentially be impacted by the construction work.
 - 3. Include project description, date taken and sequential number on back of each photograph.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.
- E. Excavate pipe trench in accordance with Section 31 23 17 for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

3.3 TRENCHING AND BACKFILL

- A. Excavate trenches in accordance with Section 31 23 17, including dewatering of excavations as required, to maintain dry conditions and preserve final grades at bottom of excavation.
- B. Place bedding and trench backfill material in accordance with Section 31 23 23.

3.4 INSTALLATION - PIPE

- A. Install PVC pipe in accordance with AWWA C605. Use only lubricants supplied by the pipe manufacturer and apply in accordance with manufacturer's recommendations. Clean the gasket, bell, groove and spigot immediately prior to connecting pipe joints.
- B. Handle and assemble pipe in accordance with manufacturer's instructions and as indicated on Drawings. Inspect each pipe and fitting prior to lowering into trench to ensure there is

no damage to the pipe, fitting or coatings. Repair any damage prior to installation. Clean ends of pipe and remove foreign material from inside of pipe and fittings.

- C. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.
- D. Maintain 10 foot horizontal separation of water main from sewer piping in accordance with local code.
- E. Install pipe to indicated elevation to within tolerance of 3 inches.
- F. Route pipe in straight line. Relay pipe that is out of alignment or grade.
- G. Twenty-foot lengths (20') of PVC pipe shall not be deflected more than 2% of their length (5") either horizontally or vertically. Any sections of pipe less than twenty feet (20') in length shall not be deflected.
- H. PVC pipe deflections may be made either at joints or by pipe bending.
 - 1. Deflection both at joints and by pipe bending shall not exceed maximum deflection recommendations by the pipe manufacturer or AWWA C605. In the case of a discrepancy between these recommendations, the smaller maximum deflection value shall apply.
- I. Install ductile iron piping and fittings to AWWA C600. Encase all ductile iron pipe and fittings in two separate, independently wrapped layers of polyethylene, per AWWA C105, Method "A". No tears, cuts, rips or other breaks in the polyethylene encasement shall be acceptable. No dirt, water or debris inside the encasement shall be acceptable. Bond all joints with two bonds per joint.
- J. Weld pipe in accordance with AWWA C206. Weld joints in accordance with AWWA C205.
- K. Flanged Joints: Not to be used in underground installations except within approved underground structures.
- L. Ductile iron and steel pipe deflections may be made at joints, provided pipe manufacturer's allowable deflection limits are not exceeded.
- M. Install pipe with no high points. If unforeseen field conditions arise which necessitate high points, increase pipe bury depth or install air release valves as directed by Engineer.
- N. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.
- O. Prevent foreign material from entering pipe during placement.
- P. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- Q. Close pipe openings with watertight plugs during work stoppages.

- R. Install access fittings to permit disinfection of water system performed under Section 33 13 00.
- S. Establish elevations of buried piping with not less than 4 foot of cover. Measure depth of cover from final surface grade to top of pipe barrel.
- T. Install tracer wire continuous, taped to top of pipeline at regular intervals not exceeding 24"; coordinate with Sections 31 23 17 and 31 23 23. Continuity of tracer wire shall be tested periodically as indicated by Engineer, and prior to final acceptance of work. Any segment of tracer wire that fails the continuity test shall be repaired or replaced by Contractor at no additional cost to Owner.
- U. Expose tracer wire at every surface penetration (i.e. valves, hydrants, vaults, etc.). Protect wire ends with wire caps and protect from corrosion. Provide extra length of tracer wire at each structure, so tracer wire can be pulled 3 feet out top of structure for connection to detection equipment.
- V. Install underground utility marking tape continuous, buried 24 inches directly above pipe, or at depth not to exceed manufacturer's guidelines for maximum bury depth. Coordinate with Section 31 23 17 and 31 23 23.
- W. Install aboveground utility markers as specified on the Drawings.

3.5 INSTALLATION - TAPPING SLEEVES AND GAUGES

- A. Install tapping sleeves and gauges in accordance with Drawings and in accordance with manufacturer's instructions.

3.6 THRUST RESTRAINTS

- A. Install tie rods, clamps, setscrew retainer glands, or restrained joints. Protect metal restrained joint components against corrosion by applying a bituminous coating, or by concrete mortar encasement of metal area. Do not encase pipe and fitting joints to flanges.
- B. Install thrust blocks or restrained fittings in accordance with Drawings and in accordance with manufacturer's instruction.
- C. Install thrust blocks, tie rods, and joint restraint at dead ends of water main.

3.7 BACKFILLING

- A. Backfill trenches for piping in accordance with Section 31 23 23.

3.8 DISINFECTION OF POTABLE WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00.

3.9 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on potable water distribution system in accordance with applicable standards:
 - 1. PVC Pipe: AWWA C605.
 - 2. Ductile Iron Pipe: AWWA C600.
 - 3. HDPE Pipe: ASTM F2164.
 - 4. Steel Pipe: AWWA C200.
- C. Hydrostatic pressure for testing shall be 1.5 times the designed working pressure at the lowest point in the line section being tested, or 150 psi minimum pressure, whichever is greater. In the event it is not possible to measure the pressure at the lowest point directly, this pressure may be calculated by measuring the pressure elsewhere within the section and calculating the pressure based on elevation difference.
 - 1. Warning: Safety is of paramount importance when conducting hydrostatic pressure leak test due to possibility of sudden violent rupture or failure.
 - 2. In no case shall the test pressure exceed the manufacturers' recommended maximum safe test pressure for the pipe or fittings.
 - 3. Contractor shall bleed all air from the system, as necessary for passing tests. .
 - 4. No observable leakage is allowed. Measurable leakage must be within the maximum allowable limits set forth by applicable AWWA and ASTM standards.
 - 5. Any leaks detected during testing shall be repaired. After repairs are completed, another full duration test shall be performed on the section of the pipeline to which the repairs were made.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to the Owner.
- E. Tolerances: Lay pipe to lines and grades shown on Drawings or as indicated by the Engineer, to the following tolerances:
 - 1. Total departure from vertical grade not to exceed 3 inches.
 - 2. Departure from vertical slope not to exceed 1/16 inch per foot.
- F. Contractor shall not connect to existing system until all testing and disinfection is complete and shall obtain written permission from the Owner to proceed with connection to the existing system.

END OF SECTION

SECTION 33 12 16

WATER UTILITY DISTRIBUTION VALVES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valves.
 - 2. Combination Air Valves.
 - 3. Valve boxes.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods.
 - 2. Section 31 22 13 - Rough Grading.
 - 3. Section 31 23 23 - Backfill.
 - 4. Section 33 11 00 - Water Utility Distribution Piping.
 - 5. Section 33 12 19 - Hydrants.
 - 6. Section 33 13 00 - Disinfection of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Valves:
 - 1. Basis of Measurement: Each.
 - 2. Basis of Payment: Includes excavation, valve, valve box, valve riser and collar, accessories, tests, backfill and compaction.

- B. Combination Air Valves:
 - 1. Basis of Measurement: By the unit.
 - 2. Basis of Payment: Includes excavation, vault, combination air valve, fittings, accessories, backfill and compaction.

1.3 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
 - 2. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
 - 3. AWWA C515 - Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.
 - 4. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.

- B. National Sanitation Foundation (NSF):
 - 1. NSF/ANSI Standard 61 - Drinking Water Components - Health Effects.

- C. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
 - 1. 801 - Installation of Water Transmission, Collector, and Distribution Lines.
 - 2. 802 - Installation of Water Service Lines.

1.4 SUBMITTALS

- A. Design Data: Submit manufacturer's latest published literature. Include illustrations, installation instructions, maintenance instructions and parts lists.
- B. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of all valves. Provide completed Water Valve Cards for each valve installed per NMSSPWC Section 801.4.
- B. Provide Operation and Maintenance Data for each type of valve installed.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with applicable New Mexico Standards and the National Fire Protection Act (NFPA).
- B. All piping, fittings, valves and any other potable water system appurtenances shall comply with the "Reduction of Lead in Drinking Water Act", in effect as of 2014, or any subsequent revision thereof.
- C. Valves: Mark valve body with manufacturer's name and pressure rating.

1.7 QUALIFICATIONS

- A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years' experience.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Prepare valves and accessories for shipment according to AWWA Standards and seal valve ends to prevent entry of foreign matter into product body.
- B. Deliver and store valves in shipping containers with labeling in place.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.
- D. Coated valves and appurtenances shall be shipped on bunks and secured with nylon belt tie down straps or padded banding over braces, and shall be stored on padded skids or other suitable means to prevent damage to coating.
- E. Coated valves shall be handled with wide belt slings, padded forks or other means to prevent damage to coating. Chains, cables or other equipment likely to damage coating or valves shall not be used.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.10 COORDINATION

- A. Coordinate work with community of Placitas, the local fire department, and utilities within construction area.

1.11 MAINTENANCE MATERIALS

- A. Furnish two (2) tee wrenches to Owner (required length) for each valve type.

PART 2 PRODUCTS

2.1 RESILIENT WEDGE GATE VALVES

- A. Manufacturers:
 - 1. American Flow Control, Series 2500
 - 2. American AVK, Series 45
 - 3. East Jordan Iron Works, FlowMaster
 - 4. J&S Valve, Model 6800 and 6900
 - 5. Kennedy
 - 6. Mueller Company
 - 7. Southern Valve and Fitting USA Inc., Series 801 and 806
 - 8. United Water Products, Model 2010
 - 9. US Pipe, MetroSeal
 - 10. Or approved equal
 - 11. Substitutions: Section 01 00 00 – Product Requirements.
- B. Resilient Wedge Gate Valves: AWWA C509/C515, NSF 61.
 - 1. Body, Bonnet, Gland Flange and Stuffing Box: Gray Iron or Ductile Iron for valves meeting AWWA C509, and Ductile Iron for valves meeting AWWA C515.
 - 2. Stem and Stem Nut: Low Zinc (<15%) Bronze or Stainless Steel.
 - a. Stem: Non-rising stem (NRS), Minimum yield strength of 40,000 psi and elongation of 12%.
 - b. Stem Nut: Minimum yield strength of 30,000 psi.
 - 3. Wedge: Ductile Iron ASTM A536 fully encapsulated with rubber.
 - 4. Bolts and Nuts: Stainless Steel.
 - 5. Operating Nut: Square; open counterclockwise unless otherwise indicated.
 - 6. Ends: Flanged or mechanical joint as directed by the Engineer.
 - 7. Coating: Fusion bonded epoxy conforming to AWWA C550; interior/exterior.
 - 8. Sizes 12 inch diameter and smaller: 250 psig.
 - 9. Sizes 16 inch diameter and larger: 200 psig.

- C. Where waterline is buried at a depth greater than 4 feet, provide valve stem extensions, complete with extension stem stabilizers, until depth of extension nut at least matches depth of operating nuts on valves installed at four-foot depth.

2.2 COMBINATION AIR VALVES

- A. Manufacturers:
 - 1. APCO Willamette Valve and Primer Corporation.
 - 2. A.R.I. Flow Control Accessories, Ltd.
 - 3. Danfoss Flowmatic.
 - 4. Val-Matic.
 - 5. Or approved equal
 - 6. Substitutions: Section 01 00 00 - Product Requirements.
- B. Valve to perform function of both air release and air/vacuum valves, and be furnished as a single body or dual body type, as indicated on the Design Drawings. Valve shall conform to AWWA C512.
- C. Working pressure for all air valve assembly wetted components shall be not less than the working pressure rating of the pipe on which they are installed.
- D. Air valve assemblies must be rated to withstand working, test and surge pressures.
- E. Cast iron body, cover and baffle; stainless steel trim and float.
 - 1. Sized for up to 800 gpm; 0 - 250 psi.
 - 2. Seat: Buna-N.
 - 3. 3" and smaller: NPT threaded outlet.
 - 4. 4" and larger: Plain outlet with steel protector hood.
- F. Coating: Fusion bonded epoxy conforming to AWWA C550 and NSF 61; interior/exterior.
- G. Accessories:
 - 1. Tapping Saddles: Double strap type, designed to hold pressures in excess of pipe working pressure per Technical Specification 33 11 00 Water Utility Distribution Piping.
 - 2. Piping: Polyethylene (PE) Pressure Pipe: AWWA C901, for Pressure Pipe and Tubing ½" through 3", ASTM D2239 SIDR 7, iron pipe size
 - a. Minimum pressure rating: 200 psi.
 - b. Fittings: AWWA C901, molded or fabricated.
 - c. Joints: Compression fittings, compatible with heavy-duty copper service fittings.
 - 3. Corporation Stops:
 - a. Brass or red brass alloy body conforming to ASTM B62.
 - b. Inlet end threaded for tapping according to AWWA C800.
 - c. Outlet end suitable for service pipe specified.
 - 4. Curb Stops:
 - a. Brass or red brass alloy body conforming to ASTM B62.
 - b. Plug type valve.
 - c. Positive pressure sealing.

5. Meter can and meter vault specifications:
 - a. Can, cover, and lid shall be rated for a load capacity of 5,000 lbs over a 10" x 10" area.
 - b. Maximum wall deflection shall not exceed 1/8" at any one point when subtracted from earth pressures or forces created during backfilling.
 - c. The material used for making the can or vault shall be non-biodegradable and corrosion-proof when buried underground and exposed to water.
 - d. The minimum dimensions of the can, cover and lid shall conform to the Standard Detail Drawings.
 - e. A 3" x 3" pipe hole shall be located at the bottom ends of the can.
 - f. The walls inside and outside of the can shall be reasonably smooth and free of burrs.
 - g. Cover of the meter can or vault must have a non-skid surface and have "WATER METER" inscribed on the top. The cover shall be secured to the can or vault by a bolt.
 - h. The 21-5/8" frost lid and entrance lid shall be centered in the cover.
 - i. The material used for manufacturing the can, cover and lid shall be new and shall be suitable for service in ambient temperatures from negative (-) 20°F to 120°F: nominal material compressive strength = 11,000 psi, nominal material tensile strength = 1,700 psi, and nominal material flexural strength = 7,500 psi.

2.3 VALVE BOXES

- A. Manufacturers:
 1. East Jordan Iron Works.
 2. Tyler Pipe.
 3. DL Foundry.
 4. SIP Industries.
 5. Or approved equal
 6. Substitutions: Section 01 00 00 – Product Requirements.
- B. 12-inch diameter Valves and Smaller: Domestic cast iron, two-piece, screw type.
- C. Valves larger than 12-inch diameter: Domestic cast iron, three-piece, screw type; round base.
- D. Where waterline is buried at a depth greater than 4 feet, provide valve box extensions as required.
- E. Cast iron lid marked "Water".

2.4 ACCESSORIES

- A. Joint Restraints: "EBAA Iron, Megalug®", or approved equal, for all pipe 4" diameter and greater, "EBAA Iron, Series 6500 and 7500", or approved equal, for all pipe from 2" to 3-1/2" diameter, installation and spacing as per manufacturer's specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Determine exact location and size of valves from Drawings; obtain clarification and directions from Engineer prior to execution of work.
- B. Verify invert elevations prior to excavation and installation of valves.

3.2 PREPARATION

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 - 1. Notify Engineer not less than 48 hours in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from the Engineer.
- D. Perform trench excavation, backfilling and compaction in accordance with Sections 31 23 17 and 31 23 23.

3.3 INSTALLATION

- A. Gate Valves and Butterfly Valves:
 - 1. Install valves in conjunction with pipe laying; set valves plumb.
 - 2. Provide buried valves with valve boxes installed flush with finished grade.
 - 3. Install valve stem risers and collars, and valve box extensions as required to match finished grade.
 - 4. All valve boxes must be centered over the operating nut. When valve key in use, key shall be centered in valve box.
 - 5. Valves shall require the same joint restraint lengths as dead-ends of similar size and pipe material.
 - 6. All buried metallic components shall be wrapped in 8-mil polyethylene.
- B. Specialty Valves and Gauges:
 - 1. Install pressure reducing valves, check valves, solenoid valves, altitude valves, combination air valves, and gauges in accordance with Drawings and in accordance with manufacturer's instructions, and the following sections of NNMSSPWC, in total or in part, except where amended by these Technical Specifications:
 - a. Section 801 – Installation of Water Transmission, Collector, and Distribution Lines.
 - b. Section 802 – Installation of Water Service Lines.
- C. Combination Air Valves:

1. Install valves at locations verified by Engineer. Valves shall be installed at system high points in the vertical position with the inlet down.
 2. If unforeseen field conditions arise which necessitate the installation of additional air release valves, such valves shall be installed as directed by the Engineer.
 - a. Additional air valves required due to unforeseen field conditions not the fault of the Contractor shall be paid for at established unit prices.
 - b. Additional air valves required due to high points caused through fault of the Contractor shall be provided at no additional cost to the Owner.
- D. Tracer Wire:
1. For direct buried valves, tape tracer wire to outside of valve box up to last section of box. Bring tracer wire into the valve box above the operating nut. Protect wire ends with wire caps and protect from corrosion. Provide extra length of tracer wire at each structure, so tracer wire can be pulled 3 feet out top of structure for connection to detection equipment.
- 3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
- A. Flush and disinfect system in accordance with Section 33 13 00.
- 3.5 FIELD QUALITY CONTROL
- A. Section 01 00 00 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
 - B. Perform pressure test on domestic site water distribution system in accordance with AWWA C605.
 - C. All valves, including butterfly valves, gate valves, check valves and air valves shall be manually actuated through their full cycle to ensure proper operation prior to installation.

END OF SECTION

SECTION 33 12 19

HYDRANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire hydrants.

- B. Related Sections:
 - 1. Section 03 05 00 - Basic Concrete Materials and Methods.
 - 2. Section 31 22 13 - Rough Grading.
 - 3. Section 31 23 23 - Backfill.
 - 4. Section 33 11 00 - Water Utility Distribution Piping.
 - 5. Section 33 12 13 - Water Service Connections.
 - 6. Section 33 12 16 - Water Utility Distribution Valves.
 - 7. Section 33 13 00 - Disinfection of Water Utility Distribution.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fire Hydrant Assemblies:
 - 1. Basis of Measurement: Each.
 - 2. Basis of Payment: Includes complete installation as shown in the standard detail: excavation, tee on mainline, waterline between tee and gate valve and between the gate valve and hydrant, hydrant, gate valve, valve riser and collar, all associated MJ fittings, thrust block installation or megalugs, gravel for drain, all other fittings and accessories necessary for a complete installation, and testing and backfill.

1.3 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
 - 2. AWWA C502 - Dry-Barrel Fire Hydrants.
 - 3. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.

- B. National Sanitation Foundation (NSF):
 - 1. NSF/ANSI Standard 61 - Drinking Water Components - Health Effects.

- C. National Fire Protection Association (NFPA):
 - 1. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking Hydrants.

- D. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
 - 1. 801 - Installation of Water Transmission, Collector and Distribution Lines.
 - 2. 802 - Installation of Water Service Lines.

1.4 SUBMITTALS

- A. Design Data: Submit manufacturer's latest published literature. Include illustrations, installation instructions, maintenance instructions and parts lists.
- B. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves, hydrants, and accessories provided meet or exceed AWWA Standards and specification requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of hydrants. Provide completed Fire Hydrant Data Cards for each valve installed per NMSSPWC Section 801.5.
- B. Provide Operation and Maintenance Data for hydrants.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with applicable New Mexico Standards and the National Fire Protection Act (NFPA).
- B. Provide uniform color scheme for fire hydrants in accordance with NFPA 291.

1.7 QUALIFICATIONS

- A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years experience.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Prepare valves, hydrants and accessories for shipment according to AWWA Standards and seal valve, hydrant and ends to prevent entry of foreign matter into product body.
- B. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.10 COORDINATION

- A. Coordinate work with community of Placitas, the local fire department, and utilities within construction area.

1.11 MAINTENANCE MATERIALS

- A. Furnish two (2) hydrant wrenches to Owner for each hydrant type.

PART 2 PRODUCTS

2.1 FIRE HYDRANTS

- A. Fire hydrant assembly includes the tee off the mainline, waterline between the tee and gate valve, gate valve, valve box, waterline between the valve and hydrant, fire hydrant, and all appurtenances including fittings, thrust blocking and joint restraints required for a complete installation, as indicated on the design drawings. The waterline material used must match that called for in Section 33 11 00.
- B. Manufacturers:
 - 1. Mueller Company
 - 2. American Flow Control
 - 3. Clow Medallion
 - 4. Kennedy Guardian
 - 5. Or approved equal
 - 6. Substitutions: Only with prior approval of Engineer.
- C. Dry-barrel Break-away Type: AWWA C502; cast-iron body, compression type valve.
 - 1. Bury Depth: As indicated on the Drawings.
 - 2. Inlet Connection: 6 inches.
 - 3. Main Valve Opening: 5-1/4 inches diameter minimum.
 - 4. Ends: Mechanical Joint or Bell End.
 - 5. Bolts and Nuts: Corrosion resistant.
 - 6. Coating: AWWA C550; interior.
 - 7. Direction of Opening: Counterclockwise unless otherwise indicated.
- D. One pumper, two hose nozzles.
 - 1. Obtain thread type and size from local fire department.
 - 2. Attach nozzle caps by separate chains.
- E. Finish: Primer and two coats of enamel, color in accordance with fire department requirements.
 - 1. Non-Potable Fire Hydrants shall be painted violet.
- F. Final selection of fire hydrant to be coordinated with local fire department for consistency with existing operating and emergency equipment.

2.2 ACCESSORIES

- A. Joint Restraints: “EBAA Iron, Megalug®”, or approved equal, for all pipe 4” diameter and greater, “EBAA Iron, Series 6500 and 7500”, or approved equal, for all pipe from 2” to 3-1/2” diameter, installation and spacing as per manufacturer's specifications.

- B. Aggregate: Aggregate for hydrant drainage specified on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Determine exact location and size of valves and hydrants from Drawings; obtain clarification and directions from Engineer prior to execution of work.
- B. Verify invert elevations prior to excavation and installation of valves and hydrants.

3.2 PREPARATION

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 - 1. Notify Engineer not less than 48 hours in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from the Engineer.
- D. Perform trench excavation, backfilling and compaction in accordance with Sections 31 23 17 and 31 23 23.

3.3 INSTALLATION

- A. Install hydrants in accordance with Drawings, manufacturer's instructions, and the following sections of NNMSSPWC, in total or in part, except where amended by these Technical Specifications:
 - 1. Section 801 - Installation of Water Transmission, Collector, and Distribution Lines.
 - 2. Section 802 - Installation of Water Service Lines.
- B. Fire Hydrants:
 - 1. Install hydrants; provide support blocking and drainage gravel; do not block drain hole.
 - 2. Set hydrants plumb with pumper nozzle facing roadway; set hydrants with centerline of pumper nozzle 18 inches above finished grade and safety flange not more than 6 inches or less than 2 inches above grade.
 - 3. Fire hydrant locations shall be no further than 10 feet from the edge of the approved access roadways with the steamer connections facing towards the driving surface. Final placement of the fire hydrants shall be coordinated and approved by the Owner prior to installation.
 - 4. Final fire hydrant locations shall be located in full view for incoming emergency responders. Landscape vegetation, utility pedestals, walls, fences, poles, and the

like shall not be located within a three foot radius of the hydrant per Article 10, Sections 1001.7.1 and 1001.7.2 of the 1997 Uniform Fire Code.

5. Fire hydrants subject to possible vehicular damage shall be adequately protected with guard posts in accordance with Section 8001.11.3 of the 1997 Uniform Fire Code.
6. Paint hydrants in accordance with local color scheme.
 - a. Non-potable fire hydrants shall be painted violet.
7. After hydrostatic testing, flush hydrants and check for proper drainage.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00.

3.5 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C605.

END OF SECTION

SECTION 33 13 00

DISINFECTION OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes disinfection of potable water distribution and transmission system; and testing and reporting results.
- B. Related Sections:
 - 1. Section 33 11 00 - Water Utility Distribution Piping: Product and Execution requirements for installation, testing, of site domestic water distribution piping.
 - 2. Section 33 12 13 - Water Service Connections.
 - 3. Section 33 12 16 - Water Utility Distribution Valves.

1.2 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. AWWA B300 - Hypochlorites.
 - 2. AWWA B301 - Liquid Chlorine.
 - 3. AWWA B302 - Ammonium Sulfate.
 - 4. AWWA B303 - Sodium Chlorite.
 - 5. AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.
 - 6. AWWA C651 - Disinfecting Water Mains.
- B. National Sanitation Foundation (NSF):
 - 1. NSF-60 - Drinking Water Treatment Chemicals - Health Effects.
- C. New Mexico Administrative Code (NMAC) - Title 20, Chapter 7, Part 10:
 - 1. Section 201: Application for Public Water System Project Approval.
 - 2. Section 400: General Operating Requirements.

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Testing Plan: Contractor must submit proposed testing procedures specific to the project including laboratory name and contact information, testing/sampling locations, method for disposal of chlorinated water and equipment to be employed for disinfection for approval by Engineer.
- D. Test Reports: Indicate results comparative to specified requirements.
- E. Certificate: Certify cleanliness of water distribution system meets or exceeds specified requirements. Contractor shall submit a notarized affidavit certifying that disinfection of the water facilities constructed was completed according to AWWA C-651

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 00 00 - Execution Requirements: Requirements for submittals.
- B. Disinfection Report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Name of person collecting samples.
 - 5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 6. Date and time of flushing start and completion.
 - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certify water conforms, or fails to conform, to bacterial standards of authority having jurisdiction.
- D. Water Quality Certificate: Certify water conforms to quality standards of authority having jurisdiction, suitable for human consumption.
- E. The Contractor shall sign an Affidavit, which they will have notarized, certifying that disinfection of the water facilities constructed was completed according to AWWA C-651. The Affidavit shall include the Contractor's name, title, signature, as well as the date of disinfection and the project name.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651.

1.6 QUALIFICATIONS

- A. Testing Firm: Company specializing in testing potable water systems, certified by State of New Mexico.
- B. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.1 DISINFECTION CHEMICALS

- A. All products added directly to water for purposes of disinfection shall conform to NSF/ANSI Standard 60.
- B. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.
- C. Per NMSSPWC Section 801.17.1, “Dry chlorine will not be used for disinfection of waterlines.”

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

- A. Prior to disinfection, thoroughly flush the system with potable, disinfected water. Flushing may be accomplished either by gravity or by pumping, provided the pump is not damaged due to insufficient head. Any damage to the pump during flushing shall be the responsibility of the Contractor and shall be repaired or replaced at no additional expense to the Owner. A minimum flow velocity of 3 feet per second (fps) is required, or as otherwise approved by Engineer.
- B. Provide and attach required equipment to perform the Work of this section.
 - 1. Contractor shall install testing saddles, if needed, to comply with spacing requirements for bacteriological testing under AWWA C651. Such testing saddles are not shown on the drawings; the associated material and installation cost shall be considered incidental to the project.
- C. Introduce treatment into piping system and perform disinfection in accordance with AWWA C651.
- D. Maintain disinfectant in system for 24 hours, or 48 hours if the temperature is less than 41 degrees Fahrenheit.”
- E. Flush, circulate, and clean using domestic water.
 - 1. Contractor shall coordinate with Owner Representative prior to using domestic water to avoid interruption of service to existing connections. Contractor shall not

exceed maximum allowable instantaneous flow (gpm) or daily flow (gpd), as specified by the Engineer.

- F. Replace permanent system devices removed for disinfection.

3.3 FIELD QUALITY CONTROL

- A. Section 01 00 00 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Disinfection, Flushing, and Sampling:
 - 1. Disinfect and test pipeline installation in accordance with AWWA C651.
 - 2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
 - 3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
 - 4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory, approved by the Engineer, to sample, test and certify water quality suitable for human consumption, in accordance with AWWA C651.
 - a. Per AWWA C651 Sec. 5.1, two samples taken are required at each sampling location. See C651 for details.
 - b. For new mains, two (2) sets of samples shall be collected every 1,200 ft of the new water main, plus one set from the end of the line and at least one from each branch greater than one pipe length, not less than 15 minutes apart at each test location.
 - c. If trench water has entered the new main during construction or if, in the opinion of the Engineer, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 ft, and the sampling location shall be identified. Samples shall be taken of water that has stood in the new main for at least 16 hr after final flushing has been completed.
 - 5. Contractor shall be reimbursed for the cost of laboratory tests upon submittal of invoice(s). The laboratory results of all tests shall be submitted directly to the Engineer. Contractor shall pay for all failed tests.
 - 6. Contractor shall not connect to existing system until all testing and disinfection is complete and shall obtain written permission from the Engineer to proceed with connection to the existing system.
- C. Re-Disinfection:
 - 1. In the event the performed water quality testing fails, the Contractor will disinfect the affected portions of the system again, and the approved testing laboratory shall sample, test and certify water quality as described in these specifications. Re-disinfection shall be performed at no additional cost to the Owner.

END OF SECTION