



**CENTRAL WEBER SEWER IMPROVEMENT DISTRICT
OGDEN, UTAH**

WEBER RIVER CROSSING PROJECT

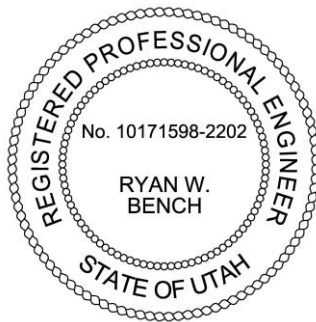
CLIENT PROJECT NO. 203017

CONTRACT/TECHNICAL SPECIFICATIONS

BID SUBMITTAL

VOLUME 1 OF 2

OCTOBER 2024



CENTRAL WEBER SEWER IMPROVEMENT DISTRICT

WEBER RIVER CROSSING PROJECT

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DOCUMENT 00111

ADVERTISEMENT FOR BIDS

CENTRAL WEBER SEWER IMPROVEMENT DISTRICT OGDEN, UTAH CWSID WEBER RIVER CROSSING PROJECT

GENERAL NOTICE

Central Weber Sewer Improvement District (Owner) is requesting Bids for the construction of the following Project:

CWSID Weber River Crossing Project

Project Number: 203017

Bids for the construction of the Project will be received at the office of the Owner located at 2618 W. Pioneer Road, until Thursday, November 7 at 10:00 a.m. local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

Install 600 feet of new gravity sewer pipe to replace an impaired pipe under the Weber River. Project includes new polymer concrete manholes, Weber River diversion and restoration, bypass pumping, excavation and fill for pipe installation, and temporary easements.

Bids are requested for the following Contract: CWSID Weber River Crossing Project.

OBTAINING THE BIDDING DOCUMENTS

Information and Bidding Documents for the Project will be sent via SharePoint to previously prequalified contractors. All official notifications, addenda, and other Bidding Documents will be offered only through the Engineer via email. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the Engineer or Owner.

PRE-BID CONFERENCE

A mandatory pre-bid conference for the Project will be held on Wednesday, October 16 at 2:00 p.m. at Central Weber Sewer Improvement District Treatment Facility administration building located at 2618 W. Pioneer Road, Ogden, Utah 84404. Bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference.

PREQUALIFICATION OF BIDDERS

Bids will be accepted only from Bidders previously prequalified by the Owner. The following Bidders have been pre-qualified to bid the project.

General Contractors:

1. Ames Construction.
2. Whitaker Construction.
3. WW Clyde.
4. VanCon, Inc.

INSTRUCTIONS TO BIDDERS

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

This Advertisement is issued by:

Owner: Central Weber Sewer Improvement District

By: Kevin Hall

Title: District Manager

Date: September 3, 2024

END OF DOCUMENT

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DOCUMENT 00200

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. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. Issuing Office—The office from which the Bidding Documents are to be issued, and which registers plan holders.
 - B. Invitation to Bid— In accordance with Utah Procurement Code, Section 63G-6-103, “Invitation for bids” shall mean all documents, whether attached or incorporated by reference, utilized for soliciting bids.

ARTICLE 2 — BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder’s responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Bidders may rely that sets of Bidding Documents are complete unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 Electronic documents:
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader, latest version. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents, or the Contractor’s means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
 - B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to

derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3 — QUALIFICATIONS OF BIDDERS

3.01 Prequalification requirements:

A. Bids will only be accepted from the previously prequalified contractors.

3.02 No requirement to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4 — PRE-BID CONFERENCE

4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or Invitation to Bid where representatives of Owner and Engineer will be present to discuss the Project.

A. Proposals will not be accepted from Bidders who do not attend the conference.

B. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation.

1. Bidders must sign in using the name of the organization that will be submitting a Bid.

C. An Addendum will be issued with a list of qualified Bidders that attended the pre-bid conference and who are eligible to submit a Bid for this Project.

D. Information presented at the pre-bid conference does not alter the Contract Documents.

1. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-bid conference.

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

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

5.01 Site and other areas:

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

5.02 Site visit and testing by Bidders:

A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. A Site visit is scheduled as part of the pre-bid conference. Maps to the Site will be made available.

C. Bidders visiting the Site are required to arrange their own transportation to the Site.

D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

5.03 Owner's safety program:

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in Document 00800 - Supplementary Conditions.

5.04 Other work at the Site:

- A. Reference is made to Document 00800 - 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.
 - 1. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6 — BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 Express representations and certifications in Bid Form, agreement:

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

ARTICLE 7 — INTERPRETATIONS AND ADDENDA

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

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

Engineer Contact Information:

Ryan Bench, PE

Email: rbench@carollo.com

Subject: CWSID Weber River Crossing Project

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to registered plan holders.

- A. Questions received less than 10 days prior to the date for opening of Bids may not be answered.

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

ARTICLE 8 — BID SECURITY

- 8.01 A Bid must be accompanied by Bid security.
- A. Amount:
 - 1. Percent of Bidder's maximum Bid price (determined by adding the base Bid and all alternates): 5 percent.
 - B. Format:
 - 1. Bid Bond.
- 8.02 Bidder must submit Document 00430 - Bid Bond that is included in the Bidding Documents.
- 8.03 The Bid security of the apparent Successful Bidder will be retained until Owner awards the Contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released.
- A. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole.
 - 1. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.04 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.05 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9 — CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in Document 00520 - Agreement Between Owner and Contractor.
- 9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in Document 00520 - Agreement Between Owner and Contractor.

ARTICLE 10 — SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 Prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda.
- A. Any assumptions regarding the possibility of post-bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.
- 10.02 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.

- A. 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 within 10 days of the issuance of the Advertisement for Bids or invitation to Bidders.
- B. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to registered Bidders.

ARTICLE 11 — SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 Requirement to retain specific Subcontractors and Suppliers:

- A. A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications.
- B. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

11.02 Submit list of the Subcontractors or Suppliers:

- A. Submit Document 00434 - Proposed Subcontractors Form to Owner with a list of the Subcontractors or Suppliers proposed.
 - 1. List Subcontractors or Suppliers proposed who will perform work or labor or render services in an amount in excess of 1 percent of Contractor’s total Bid:
 - a. Within 24 hours after the deadline established by Owner for receipt of Bids.
 - 1) Changes or substitutions will be allowed, except as otherwise provided by law.

11.03 Request to submit an acceptable substitute:

- A. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- B. If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers.
 - 1. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder.
- C. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Document 00700 - General Conditions.

ARTICLE 12 — PREPARATION OF BID

- 12.01 Document 00410 - Bid Form is included with the Bidding Documents.
- A. Complete blanks on the Bid Form in ink.
 - B. Sign the Bid Form signed in ink with names printed in ink below the signatures.
 - C. Erasures or alterations must be initialed in ink by the person signing the Bid Form.
 - D. Indicate a Bid price for each section, Bid item, alternate, adjustment unit price item, and unit price item listed.
 - E. 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.”
 - F. Unauthorized conditions, limitations, or modifications attached to the Bid will render it informal and may cause its rejection as being non-responsive.
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents.
- A. The printed copy of the Bid Form must be clearly legible, printed on 8-1/2-inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical.
 - B. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign.
- A. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign.
- A. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign.
- A. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder’s name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form.
- A. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 The Bid must contain an acknowledgment of receipt of Addenda, the numbers of which must be filled in on the Bid Form.

- 12.09 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.10 Bidder's state contractor license number must be shown on the Bid Form.
- 12.11 Postal and email addresses and telephone number for communications regarding the Bid must be shown.
- 12.12 Bid preferences:
- A. Submit with Bid Document 00453 - Bid Preferences to certify the preferences to which the Bidder may be entitled in accordance with Utah Procurement Code, Section 63G-6-404.
 - B. In accordance with Utah Code, Section 34-30-1, in employing workmen in the construction of public works by the state of Utah or any county or municipality, or by persons contracting with the state of Utah or any county or municipality, preference shall be given citizens of the United States, or those having declared their intention of becoming citizens.
 - C. In accordance with Utah Code, Section 34-30-1, if the provisions are not complied with, this Agreement shall be void.

ARTICLE 13 — BASIS OF BID

13.01 Lump Sum:

- A. Bidders must submit bids for each option on a lump sum basis per the bid schedules.

ARTICLE 14 — SUBMITTAL OF BID

14.01 Submit Bids and required Bid documents under the terms of the Bid Form.

- A. Hardcopy:
 - 1. Unbound documents.
 - 2. Bound documents into a hard copy Bid package.
 - a. Include 1 separate unbound copy of the Bid Form, and, if required, the Bid Bond Form.
 - 3. Bid must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, and the name and address of Bidder.
 - a. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED".
 - b. A mailed Bid must be addressed to the location designated in the Advertisement.

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid.

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

ARTICLE 15 — MODIFICATION AND WITHDRAWAL OF BID

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

ARTICLE 16 — OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly.
- A. 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.
- 16.02 The 3 lowest Bidders shall submit within 72 hours of the Bid opening, 1 copy of documentary information generated in preparation of Bid prices for this Project, as specified in Document 00823 - Escrow Bid Documents.

ARTICLE 17 — BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18 — EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids.
- A. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 Evaluation of Bids:
- If the Owner awards the Contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive bid for Option #1 (Table A - Option #1 Bid Form). At the Owner's option, Option #2 may be selected as the preferred option to the project, in lieu of Option #1, and by such selection by the Owner, such award will be to the responsible Bidder submitting the lowest responsive Bid for Option #2 (Table B - Option #2 Bid Form). Owner reserves the right to select either Option #1 or Option #2.

18.04 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors.

ARTICLE 19 — BONDS AND INSURANCE

19.01 Document 00700 - General Conditions sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance.

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

19.02 Bid Security, requirements of providing Bid bonds as part of the bidding process are specified in this document.

ARTICLE 20 — SIGNING OF AGREEMENT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement.

A. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner.

B. Within 10 days thereafter, Owner will deliver 1 fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated the General Conditions.

ARTICLE 21 — SALES AND USE TAXES

21.01 Contractor shall pay all sales, use and other taxes as specified in Document 00700 - General Conditions.

END OF DOCUMENT

DOCUMENT 00410

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, Document 00700 - General Conditions, and Document 00800 - Supplementary Conditions.

ARTICLE 1 — OWNER AND BIDDER

1.01 This Bid is submitted to:

Central Weber Sewer Improvement District
218 W. Pioneer Rd.
Ogden, UT 874404

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

ARTICLE 2 — ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security in the form of cash, a certified or cashier's check, or a Bid Bond as specified in Document 00430 - Bid Bond (Penal Sum).
- B. Document 00434 - Proposed Subcontractors Form.
- C. Document 00453 - Bid Preferences.

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

3.01 Lump Sum Bids.

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices:
 - 1. Lump Sum Price

Table A - Option #1 Bid Form (FRPMP)		
Bid Item Number	Description	Price in Figures (\$)
1	Lump Sum Bid Price (excluding item 2)	\$
2	Total of All Unit Price Bid Items for Option #1 (From Table 1A)	\$
Total Lump Sum Option #1 Bid Price (Sum of Items 1 and 2)		\$

Table B - Option #2 Bid Form (HDPE)		
Bid Item Number	Description	Price in Figures (\$)
1	Lump Sum Bid Price (excluding item 2)	\$
2	Total of All Unit Price Bid Items for Option #2 (From Table 1B)	\$
Total Lump Sum Option #2 Bid Price (Sum of Items 1 and 2)		\$

3.02 Unit Price Bids.

- A. Bidder will perform the following Work at the indicated unit prices. See Section 01220 - Measurement and Payment for descriptions of each unit price item:

Table 1A - Unit Price Bids for Option #1					
Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
1	<i>From EX SSMH #2 to SSMH #1 (Open Field Section)</i>				
	Installation of new SS 48-inch FRPMP Pipe	Feet	303	\$	\$
2	<i>From SSMH #1 to Existing Pipe Near Vault (River Crossing Section)</i>				
	Installation of new SS 48-inch FRPMP Pipe with concrete encasement	Feet	185	\$	\$
Total of All Unit Price Bid Items for Option #1					\$

Table 1B - Unit Price Bids for Option #2					
Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
1	<i>From EX SSMH #2 to SSMH #1 (Open Field Section)</i>				
	Installation of new SS 48-inch HDPE Pipe	Feet	303	\$	\$
2	<i>From SSMH #1 to Existing Pipe Near Vault (River Crossing Section)</i>				
	Installation of new SS 48-inch HDPE Pipe with Steel Casing	Feet	185	\$	\$
Total of All Unit Price Bid Items for Option #2					\$

- B. Bidder acknowledges that:
 1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item.
 2. Estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 4 — TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with the Document 00700 - General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5 — BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

- 5.01 Bid acceptance period.
 - A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.
- 5.02 Instructions to Bidders.
 - A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.
- 5.03 Receipt of Addenda.
 - A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6 — BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

- 6.01 Bidder's Representations.
 - A. In submitting this Bid, Bidder represents the following:
 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Document 00800 - Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been

identified in the Document 00800 - Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Document 00800 - Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 Bidder's Certifications.

- A. The Bidder certifies the following:
 1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
 2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
 3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
 4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract as defined below:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between 2 or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

- d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
5. In accordance with the Utah Code, Bidder certifies that Bidder has paid Utah state and local taxes for 5 successive years before submitting this Bid to Owner.
6. Bidder has read and complies with Utah Procurement Code, Title 63G, Chapter 6 et seq. as amended, and bidding and contractual amendments.

BIDDER hereby submits this Bid as set forth above:

A Limited Liability Corporation

Limited Liability Corporation Name: _____

By: _____

(Signature of managing member -- attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____

END OF DOCUMENT

DOCUMENT 00430

BID BOND (PENAL SUM FORM)

<p>Bidder Name: _____ Address <i>(principal place of business)</i>: _____</p>	<p>Surety Name: _____ Address <i>(principal place of business)</i>: _____</p>
<p>Owner Name: _____ Address <i>(principal place of business)</i>: _____</p>	<p>Bid Project <i>(name and location)</i>: _____ Bid Due Date: _____</p>
<p>Bond Penal Sum: _____ Date of Bond: _____</p>	
<p>Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.</p>	
<p>Bidder</p>	<p>Surety</p>
<p style="text-align: center;"><i>(Full formal name of Bidder)</i></p>	<p style="text-align: center;"><i>(Full formal name of Surety) (corporate seal)</i></p>
<p>By: _____ <i>(Signature)</i></p>	<p>By: _____ <i>(Signature) (Attach Power of Attorney)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p>Attest: _____ <i>(Signature)</i></p>	<p>Attest: _____ <i>(Signature)</i></p>
<p>Name: _____ <i>(Printed or typed)</i></p>	<p>Name: _____ <i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>
<p><u>Notes:</u> (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</p>	

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

END OF DOCUMENT

DOCUMENT 00434

PROPOSED SUBCONTRACTORS FORM

The listing of more than one subcontractor for each item of Work to be performed with the words "and/or" will not be permitted.

Bidder certifies that all Subcontractors listed are eligible to perform the Work.

Add additional sheets, if necessary, to list all Subcontractors.

If no Subcontractors are listed, it will be assumed that no Subcontractors are to be employed meeting the above conditions.

BIDDER

(Signature)

(Date)

Work to be Performed	Contractor Name	License Type/Number	Percent of Total Contract
1.	Prime Contractor		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Work to be Performed	Contractor Name	License Type/Number	Percent of Total Contract
13.			
14.			

END OF DOCUMENT

DOCUMENT 00453

BID PREFERENCES

- 1.01 Do you claim a bid preference in accordance with Utah Procurement Code 63g-6-404 — Preference for Providers of State Products?
[] Yes [] No
- A. If so, are you submitting proof of qualification for bid preference?
[] Yes [] No
- 1.02 Do you claim a bid preference in accordance with Utah Procurement Code 63g-6-405 — Preference for Resident Contractors?
[] Yes [] No
- A. If so, are you submitting proof of qualification for bid preference?
[] Yes [] No
- 1.03 Did you claim a bid preference in accordance with Utah Procurement Code 63g-6-406 — Preference for Recycled Paper and Paper Products?
[] Yes [] No
- A. If so, are you submitting proof of qualification for bid preference?
[] Yes [] No

END OF DOCUMENT

DOCUMENT 00510

NOTICE OF AWARD

Date of
Issuance:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project
No.:

Project:

Contract Name:

Bidder:

Bidder's
Address:

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

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

The Contract Price of the awarded Contract is **[\$[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract.

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

Drawings will be delivered separately from the other Contract Documents.

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

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

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

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

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

By (*signature*): _____

Name (*printed*): _____

Title: _____

Copy: Engineer

END OF DOCUMENT

DOCUMENT 00520

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement is by and between Central Weber Sewer Improvement District (“Owner”) and _____ (“Contractor”).

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

Owner and Contractor hereby agree as follows:

ARTICLE 1 — WORK

1.01 Contractor shall complete Work as specified or indicated in the Contract Documents. the Work is generally described as follows: Weber River Crossing Project

ARTICLE 2 — THE PROJECT

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

The project includes the installation of a new gravity sewer pipe to replace an impaired pipe under the Weber River. Project includes new polymer concrete manholes, Weber River diversion, bypass pumping, excavation and fill for pipe installation, and temporary easements.

ARTICLE 3 — ENGINEER

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

ARTICLE 4 — CONTRACT TIMES

- 4.01 Time is of the essence:
- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 Contract times: Days:
- A. The Work will be substantially complete within 130 days after the date when the Contract Times commence to run as provided in the General Conditions, and completed and ready for final payment in accordance with the General Conditions within 15 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 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or

arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$2,500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$2,500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
4. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.04 Special damages:

- A. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.
- B. Contractor shall reimburse Owner for:
 1. Any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and
 2. The actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- C. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 5 — CONTRACT PRICE

5.01 Owner will 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 Work, at the prices stated in contractor's Bid, totaling \$_____ and attached hereto as an exhibit.

ARTICLE 6 — PAYMENT PROCEDURES

6.01 Submittal and processing of Payments:

- A. Contractor shall submit Applications for Payment in accordance with the General Conditions.

6.02 Progress Payments; Retainage:

- A. Owner will make progress payments on the basis of Contractor's Applications for Payment on or about the 5th day of each month during performance of the Work as provided in below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of 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. In accordance with Utah Procurement Code, Section 13-8-5, 95 percent of the value of the Work completed (with the balance being retainage).
- C. In accordance with Utah Procurement Code, Section 13-8-5, 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- D. In accordance with Utah Procurement Code, Section 13-8-5, upon Substantial Completion, Owner will pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner in accordance with the General Conditions, and less 125 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 Final payment:

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

6.04 Consent of surety:

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

ARTICLE 7 — CONTRACT DOCUMENTS

7.01 Contents:

- A. The Contract Documents consist of the following:
 - 1. This Agreement.
 - 2. Bonds:
 - a. Document 00610 - Performance Bond (together with power of attorney).
 - b. Document 00615 - Payment Bond (together with power of attorney).
 - 3. Document 00700 - General Conditions.
 - 4. Document 00800 - Supplementary Conditions.
 - 5. Specifications as listed in the table of contents of the project manual.
 - 6. Drawings listed on the sheet index.
 - 7. Addenda (numbers _____ to _____ inclusive).
 - 8. Exhibits to this Agreement (enumerated as follows):
 - a. Document 00434 - Proposed Subcontractors Form.
 - b. Document 00453 - Bid Preferences.
 - c. Document 00823 - Escrow Bid Documents.

9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Document 00550 - Notice to Proceed.
 10. The Contract Documents listed above are attached to this Agreement (except as expressly noted otherwise above).
- B. There are no Contract Documents other than those listed above.
- C. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.
- D. In accordance with Utah Procurement Code, Section 63G-6-817, the statute of limitations for actions with respect to the contract are set forth.

ARTICLE 8 — REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's representations:

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. [Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the General Conditions.
 5. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the General Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on:
 - a. the cost, progress, and performance of the Work;
 - b. the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and
 - c. Contractor's safety precautions and programs.
 6. 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.
 7. 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.
 8. Contractor has given Engineer written notice of conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

9. The Contract Documents are generally sufficient to indicate and convey understanding of terms and conditions for performance and furnishing of the Work.
10. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 Contractor's certifications:

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this paragraph:
 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 2 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.

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

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

Owner:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

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

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

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

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

END OF DOCUMENT

[EXHIBIT A - Successful Bidder's Bid Form]

DOCUMENT 00550

NOTICE TO PROCEED

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

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on _____ pursuant to the General Conditions.

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

In accordance with the Agreement:

The number of days to achieve Substantial Completion is 90 days from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

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

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

Owner: Central Weber Sewer Improvement District
By (signature): _____
Name _____
Title: _____
Date Issued: _____
Copy: Engineer

END OF DOCUMENT

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DOCUMENT 00610

PERFORMANCE BOND

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated in this Document by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within 5 business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within 10 business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When 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 7 days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within 2 years after a declaration of Contractor Default or within 2 years after the Contractor ceased working or within 2 years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated in this Document. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
14. Now, therefore, the condition of this obligation is such, that if the Principal faithfully performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of the Agreement during the original term of the Agreement and any extension of the Agreement, with or without notice to the Surety, and during the life of any guaranty required under the Agreement, and also performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of all duly authorized modifications of the Agreement that may hereafter be made, notice of which modifications to the Surety being hereby waived, the above obligation is void. Otherwise it remains in full force and effect.
15. Provided, however, that this bond is executed in accordance with Utah Code, Section 14-1-18 and Utah Code, Section 63G-6-505, as amended, and all liabilities on this bond shall be determined in accordance with Utah Code, Section 14-1-18 and Utah Code, Section 63G-6-505, as amended, to the extent as if it were copied at length in this Agreement.
16. Definitions:
 - 16.1. 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.
 - 16.2. 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.
 - 16.3. 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.
 - 16.4. Owner Default—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5. Contract Documents—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: None.

END OF DOCUMENT

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DOCUMENT 00615

PAYMENT BOND

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

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

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

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: None
19. This Bond is in accordance with Utah Code, Section 14-1-18, Section 14-1-19, and Utah Code, Section 63G-6-505.

END OF DOCUMENT

DOCUMENT 00700

GENERAL CONDITIONS

Prepared By



Endorsed By



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DOCUMENT 00700

GENERAL CONDITIONS

ARTICLE 1 — DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

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

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

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.
43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
 - a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

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

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or

any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

- C. *Day*: The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective*: The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 — PRELIMINARY MATTERS

2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by

Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

- C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 Copies of Documents

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

2.03 Before Starting Construction

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 Preconstruction Conference; Designation of Authorized Representatives

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

2.05 Acceptance of Schedules

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be

held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 Electronic Transmittals

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

ARTICLE 3 — CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part

thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

- G. Nothing in the Contract Documents creates:
1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 Reference Standards

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

3.03 Reporting and Resolving Discrepancies

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

Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

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

B. *Resolving Discrepancies*

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

3.04 Requirements of the Contract Documents

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 Reuse of Documents

- A. Contractor and its Subcontractors and Suppliers shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 — COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

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

4.02 Starting the Work

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

4.03 Reference Points

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

4.04 Progress Schedule

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

4.05 Delays in Contractor's Progress

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.
- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
 - 1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 - 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 - 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
 - 1. The circumstances that form the basis for the requested adjustment;
 - 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 - 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 - 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

5.01 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 Use of Site and Other Areas

- A. *Limitation on Use of Site and Other Areas*
 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
 - D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 Subsurface and Physical Conditions

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
 2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
 3. Technical Data contained in such reports and drawings.
- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.
- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 - 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 - 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 Differing Subsurface or Physical Conditions

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

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04

are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 Underground Facilities

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

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

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

- E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 Hazardous Environmental Conditions at Site

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
 2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers,

directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 — BONDS AND INSURANCE

6.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a

prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 Insurance—General Provisions

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may

impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.
- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 Contractor's Insurance

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.

- C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);
 4. not seek contribution from insurance maintained by the additional insured; and
 5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 Builder's Risk and Other Property Insurance

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

for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 Property Losses; Subrogation

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.
 - 1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 - 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
 - 1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the

Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 Receipt and Application of Property Insurance Proceeds

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

ARTICLE 7 — CONTRACTOR'S RESPONSIBILITIES

7.01 Contractor's Means And Methods Of Construction

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

7.02 Supervision and Superintendence

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

7.03 Labor; Working Hours

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

7.04 Services, Materials, and Equipment

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

7.05 "Or Equals"

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and

sufficiently similar so that no change in related Work will be required, Engineer will deem it an “or equal” item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

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

7.06 Substitutes

- A. *Contractor’s Request; Governing Criteria:* Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is

functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor

shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

7.07 Concerning Subcontractors and Suppliers

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 Patent Fees and Royalties

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

of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 Permits

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

7.10 Taxes

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

7.11 Laws and Regulations

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

7.12 Record Documents

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field

Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 Safety and Protection

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

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

7.14 Hazard Communication Programs

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

7.15 Emergencies

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

7.16 Submittals

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

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

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
 8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.
- D. *Resubmittal Procedures for Shop Drawings and Samples*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
 2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
 3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.
- E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*
1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.
 - d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.

- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

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

7.18 Indemnification

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

7.19 Delegation of Professional Design Services

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

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

ARTICLE 8 — OTHER WORK AT THE SITE

8.01 Other Work

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is

performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 Coordination

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

8.03 Legal Relationships

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work,

and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 — OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

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

9.02 Replacement of Engineer

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

9.03 Furnish Data

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

9.04 Pay When Due

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

9.05 Lands and Easements; Reports, Tests, and Drawings

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

- 9.06 Insurance
 - A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 Change Orders
 - A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 Inspections, Tests, and Approvals
 - A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 Limitations on Owner's Responsibilities
 - A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 Undisclosed Hazardous Environmental Condition
 - A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 Evidence of Financial Arrangements
 - A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 Safety Programs
 - A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 — ENGINEER'S STATUS DURING CONSTRUCTION

- 10.01 Owner's Representative
 - A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.
- 10.02 Visits to Site
 - A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's

efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 Resident Project Representative

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

10.04 Engineer's Authority

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.
- E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 Determinations for Unit Price Work

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

10.06 Decisions on Requirements of Contract Documents and Acceptability of Work

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

10.07 Limitations on Engineer's Authority and Responsibilities

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 Compliance with Safety Program

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

ARTICLE 11 — CHANGES TO THE CONTRACT

11.01 Amending and Supplementing the Contract

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

11.02 Change Orders

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

11.03 Work Change Directives

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.
- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 Field Orders

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

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

11.05 Owner-Authorized Changes in the Work

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

11.06 Unauthorized Changes in the Work

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

11.07 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 - 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 - 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

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

11.08 Change of Contract Times

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

11.09 Change Proposals

- A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or

relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. Change Proposal Procedures

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

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

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

- C. Resolution of Certain Change Proposals**: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice

will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 Notification to Surety

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

ARTICLE 12 — CLAIMS

12.01 Claims

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

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

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

13.01 Cost of the Work

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees

include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.
 - c. *Construction Equipment Rental*
 - 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and

removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by

Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.
3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
6. Expenses incurred in preparing and advancing Claims.
7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. Contractor's Fee

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

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

13.02 Allowances

- A.** It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be

performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

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

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.
- E. *Adjustments in Unit Price*
 - 1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
 - 2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to

perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

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

14.01 Access to Work

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

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 Defective Work

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 Acceptance of Defective Work

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

14.05 Uncovering Work

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

14.06 Owner May Stop the Work

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

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 - 3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications*
 - 1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend

- payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

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

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 Contractor's Warranty of Title

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

15.03 Substantial Completion

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

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

15.04 Partial Use or Occupancy

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
 2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 Final Inspection

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

15.06 Final Payment

- A. *Application for Payment*
 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

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

Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 Waiver of Claims

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 Correction Period

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

- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 — SUSPENSION OF WORK AND TERMINATION

16.01 Owner May Suspend Work

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

16.02 Owner May Terminate for Cause

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

- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 Owner May Terminate for Convenience

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

16.04 Contractor May Stop Work or Terminate

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

submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 — FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

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

ARTICLE 18 — MISCELLANEOUS

18.01 Giving Notice

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

18.02 Computation of Times

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

18.03 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions

of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 Limitation of Damages

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

18.05 No Waiver

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

18.06 Survival of Obligations

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

18.07 Controlling Law

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

18.08 Assignment of Contract

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

18.09 Successors and Assigns

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

18.10 Headings

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

END OF DOCUMENT

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DOCUMENT 00800

SUPPLEMENTARY CONDITIONS

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These Supplementary Conditions amend or supplement Document 00700 - General Conditions. The General Conditions remain in full force and effect, except as amended.

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

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

ARTICLE 1 — DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

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

Final Completion - The Work is complete when it is ready for final payment as established by the Engineer's written recommendation of final payment as set forth in Paragraph 15.06.

"Or Equal": Alternate product that does not affect Contract Time, Contract Price, or Contract Scope.

Substitution: Alternate product that requires a Change Order to adjust the Contract Time, Contract Price, or Contract Scope.

Technical Sections: Project Specifications in CSI MasterFormat® Division 02 and higher.

ARTICLE 2 — PRELIMINARY MATTERS

2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance

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

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

2.02 Copies of Documents

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

- A. Owner shall furnish to Contractor 1 printed copies of conformed documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including 1 fully signed counterpart of the Agreement), and 1 copy in electronic portable document format (PDF). Additional printed copies of the conformed documents will be furnished upon request at the cost of reproduction.

2.06 Electronic Transmittals

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

- B. Electronic Documents Protocol: The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol (“EDP” or “Protocol”) for exchange of electronic transmittals.
 1. Basic Requirements:
 - a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
 - b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
 - c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.
 - d. Except as otherwise explicitly stated in this Document, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.
 - e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party’s use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.
 - f. Nothing herein negates any obligation (1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; (2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or (3) to comply with the notice requirements of General Conditions, Paragraph 18.01.

2. System Infrastructure for Electronic Document Exchange:
 - a. Each party will provide hardware, operating system(s) software, internet, email, and large file transfer functions (“System Infrastructure”) at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.
 - 1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is [] MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.
 - 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.
 - b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology (“IT”) for maintaining operations of its System Infrastructure during the Project, including coordination with the party’s individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
 - c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, Trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.
 - d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.
 - e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

- f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
 - g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.
 - h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:
 - 1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
 - 2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;
 - 3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication, and document archives, etc.); and
 - 4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.
- C. Software Requirements for Electronic Document Exchange; Limitations:
- 1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this Section of the EDP.
 - a. Prior to using any updated version of the software required in this Section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.
 - 2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.
 - 3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Table 1, including software versions, if listed.

Table 1. Software Requirements for Electronic Document Exchange

Item	Electronic Documents	Transmittal Means	Data Format	Note ⁽¹⁾
a.1	General communications, transmittal covers, meeting notices and responses to general information requests for which there is no specific prescribed form.	EADOC	EADOC	
a.2	Meeting agendas, meeting minutes, RFIs and responses to RFIs, and Contract forms.	EADOC	PDF	(2)
a.3	Contactors Submittals (Shop Drawings, "or equal" requests, substitution requests, documentation accompanying Sample submittals and other submittals) to Owner and Engineer, and Owner's and Engineer's responses to Contractor's Submittals, Shop Drawings, correspondence, and Applications for Payment.	EADOC	PDF	
a.4	Correspondence; milestone and final version Submittals of reports, layouts, Drawings, maps, calculations and spreadsheets, Specifications, Drawings and other Submittals from Contractor to Owner or Engineer and for responses from Engineer and Owner to Contractor regarding Submittals.	EADOC	PDF	
a.5	Layouts and drawings to be submitted to Owner for future use and modification.	EADOC	DGN/DWG	
a.6	Correspondence, reports, and Specifications to be submitted to Owner for future word processing use and modification.	EADOC	DOC	
a.7	Spreadsheets and data to be submitted to Owner for future data processing use and modification.	EADOC	EXC	
a.8	Database files and data to be submitted to Owner for future data processing use and modification.	EADOC	DB	

Notes:

- (1) All exchanges and uses of transmitted data are subject to the appropriate provisions of Contract Documents.
- (2) Transmittal of written notices is governed by General Conditions, Paragraph 18.01.

Key:

DB Microsoft® Access .mdb format.
 DGN Microstation .dgn format.
 DOC Microsoft® Word .docx format.

Item	Electronic Documents	Transmittal Means	Data Format	Note ⁽¹⁾
DWG	Autodesk® AutoCAD .dwg format.			
EADOC	Web-Based Construction Document Management System.			
Email	Standard Email formats (.htm, .rtf, or .txt). Do not use stationery formatting or other features that impair legibility of content on screen or in printed copies.			
EXC	Microsoft® Excel .xls or .xml format.			
LFE	Agreed upon Large File Exchange method (FTP, CD, DVD, hard drive).			
PDF	Portable Document Format readable by Adobe® Acrobat Reader.			

SC-2.06 Add the following new paragraph immediately after Paragraph 2.06.C:

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

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

Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis (at \$150 per hour) for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

ARTICLE 3 — CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

SC-3.01 Add the following new subparagraph after Paragraph 3.01.A:

1. Requirements stated in the following CSI MasterFormat® divisions apply to the Technical Sections.
 - a. Division 00 - Procurement and Contracting Requirements, from Document 00500 and higher.
 - b. Division 01 - General Requirements.

ARTICLE 4 — COMMENCEMENT AND PROGRESS OF THE WORK

4.05 Delays in Contractor's Progress

SC-4.05 Add the following new subparagraph after Paragraph 4.05.C.4:

5. Weather-Related Delays:
 - a. Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by Ogden-Hinckley Airport (KOGD) weather monitoring station.
 - b. The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor's then-current Progress Schedule's critical path for the Project.

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

5.01 Availability of Lands

SC-5.01 Add the following language at the end of the last sentence of Paragraph 5.01.A:

Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may request an amendment to the Contract Documents as provided in Article 11.

SC-5.01 Add the following new paragraph immediately after Paragraph 5.01.C:

- D. Any Work performed in public rights-of-way, in addition to conforming to the Contract Documents, shall be done in accordance with the requirements of the permit issued by the public agency in whose right-of-way the Work is located.

5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D.4:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that are provided as supplemental information and contain no Technical Data. These are not Contract Documents:

Report Title	Date of Report
CWSID Geotechnical Investigation - River Crossing Project	Aug 2024

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that are provided as supplemental information and contain no Technical Data. These are not Contract Documents:

Drawings Title	Date of Drawings
West Weber South and North Pump Stations	Sep 1999
West Weber Area Outfall Sewer	Nov 2002

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

5.05 Underground Facilities

SC-5.05 Delete Paragraph 5.05.F.4 in its entirety and insert the following in its place:

4. The information and data shown or indicated on the Drawings listed in the following table with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with industry best practices. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph.

Drawings Title	Date of Drawings
West Weber South and North Pump Stations	Sep 1999
West Weber Area Outfall Sewer	Nov 2002

5.06 Hazardous Environmental Conditions at Site

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

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site and are provided as

supplemental information and contain no Technical Data. These are not Contract Documents:

- a. No reports or drawings related to Hazardous Environmental Conditions at the site are known to Owner.

Report Title	Date of Report
N/A	-

ARTICLE 6 — BONDS AND INSURANCE

6.01 Performance, Payment, and Other Bonds

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

1. Required Performance Bond Form: The performance bond that Contractor furnishes will be in the form of Document 00610 - Performance Bond.
2. Required Payment Bond Form: The payment bond that Contractor furnishes will be in the form of Document 00615 - Payment Bond.

6.02 Insurance—General Provisions

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

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

6.03 Contractor's Insurance

SC-6.03 Add the following new paragraphs immediately after Paragraph 6.03.C.5:

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

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable.	Statutory
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$2,000,000

- F. Commercial General Liability—Claims Covered: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. Commercial General Liability—Form and Content: Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for 3 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 3 years thereafter.
 2. Blanket contractual liability coverage, including, but not limited to, coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

- H. Commercial General Liability—Excluded Content: The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
 6. Any limitation or exclusion based on the nature of Contractor’s work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

- I. Commercial General Liability—Minimum Policy Limits:

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

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

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$N/A
Each Accident	\$N/A
Property Damage	
Each Accident	\$N/A
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$2,000,000

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

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

- L. Contractor's Pollution Liability Insurance: Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than 3 years after final completion.

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

- M. 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 must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of 2 years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	\$1,000,000
Annual Aggregate	\$1,000,000

6.04 Builder's Risk and Other Property Insurance

SC-6.04 Delete Paragraph 6.04.A in its entirety and insert the following in its place:

- A. Owner shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations).

SC-6.04 Add the following new paragraphs immediately after Paragraph 6.04.E:

- F. Builder's Risk Requirements: The builder's risk insurance must:
1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition

occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

- a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 3. cover expenses incurred in the repair or replacement of any insured property (including, but not limited to, fees and charges of contractors, engineers, and architects).
 4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of \$2,000,000.
 5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of \$2,000,000.
 6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
 7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
 8. include performance/hot testing and start-up, if applicable.
 9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
 10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds."
 12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of \$1,000,000.

- G. Builder's Risk and Other Property Insurance Deductibles: The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.
 - 1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$2,000,000 for direct physical loss in any one occurrence.

ARTICLE 7 — CONTRACTOR'S RESPONSIBILITIES

7.03 Labor; Working Hours

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to read as follows:

- C. "...all Work at the Site must be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday unless authorized to do so by the Owner with two weeks of advance notice. Contractor will not perform Work on Sunday, or any legal holiday."

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

- 1. Regular working hours will be 7:00 a.m. to 5:00 p.m.

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

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

7.07 Concerning Subcontractors, Suppliers, and Others

SC-7.07 Add the following new subparagraph immediately after Paragraph 7.07.B:

- 1. Subcontracting: Contractor shall perform with Contractor's own organization work amounting to not less than 51 percent of the combined value of all items of the Work covered by the Contract.

7.09 Permits

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

- B. Owner will provide the following permits:
 - 1. County Flood Plain Permit (Weber County).
 - 1. Nationwide 404 Permit (Army Corps) & Utah Stream Alteration Permit (UDWQ and Army Corps).

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

- B. Storm Water Pollution Prevention Plan (SWPPP).
 - 1. Owner has a current Storm Water Pollution Prevention Plan (SWPPP).
 - 2. Contractor will provide the following information for the construction project site-specific activity related to storm water:
 - a. Updated procedures, schedule, and area.
 - b. Updated drawings.

3. Contractor responsibilities:
 - a. Compliance with the SWPPP.
 - b. Costs associated with complying with the SWPPP.

B. Temporary Easements for entrance and construction related work with Landowner

7.11 Laws and Regulations

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

- D. Contractor's Continuing Obligation: Contractor's obligation to perform services in connection herewith will be in accordance with Utah UCA, Title 70A.
- E. Contract Documents include clauses in accordance with Utah Code, Section 63G-6-601 providing for adjustments in prices, time of performance, or other appropriate contract provisions.
- F. Controlling law:
 1. The district court shall have jurisdiction over an action, whether in law or equity, in accordance with Utah Procurement Code, Section 63G-6-815.
 2. Actions under Utah Procurement Code, Section 63G-6-815 shall be initiated according to Section 63G-6-817 Statute of Limitations.
 3. This contract is to be governed in accordance with Utah Procurement Codes and Rules.

7.13 Safety and Protection

SC-7.13 Add the following new paragraph immediately after Paragraph 7.13.G:

1. The following Owner safety programs are applicable to the Work: Coordinate with Owner for safety plan.

7.17 Contractor's General Warranty and Guarantee

SC-7.17 Delete Paragraph 7.17.B. and subparagraphs in their entirety and insert the following in its place:

- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08.

7.18 Indemnification

SC-7.18 Delete Paragraphs 7.18.A and 7.18.B in their entirety and insert the following in their place:

- 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, Engineer, and Construction Manager 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, Engineer, or Construction Manager 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.

7.19 Delegation of Professional Design Services

SC-7.19 Add the following new subparagraph immediately after Paragraph 7.19.A.

1. Where the technical specs require the Contractor to provide professional design services and to submit signed and sealed documents from a registered professional engineer, such Work is "Delegated Design".

ARTICLE 8 — OTHER WORK AT THE SITE (NOT USED)

ARTICLE 9 — OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

SC-9.01 Delete Paragraph 9.01.A in its entirety and insert the following in its place:

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Construction Manager.
- B. Construction Manager will establish and implement procedures, including testing, reviewing and processing requests for clarifications and interpretations of the Contract Documents; Shop Drawings, samples, and other submittals; schedule adjustments; Change Order proposals; written proposals for substitutions; payment applications; and maintenance of logs.

ARTICLE 10 — ENGINEER'S STATUS DURING CONSTRUCTION

10.03 Resident Project Representative

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

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
 1. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. Safety Compliance: Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.

3. Liaison:
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. Review of Work; Defective Work:
 - a. Conduct on-site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is, in general, proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection, or approval.
 5. Inspections and Tests:
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including, but not limited to, those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 6. Payment Requests: Review Applications for Payment with Contractor.
 7. Completion:
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 6. Participate in specialized field or laboratory tests or inspections conducted off site by others, except as specifically authorized by Engineer.
 7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11 — CHANGES TO THE CONTRACT

11.02 Change Orders

SC-11.02 Insert the following new paragraph immediately following Paragraph 11.02.A.3:

- a. Changes in Contract Price are subject to prior written certification that the Change Order is within the determined Project budget in accordance with Utah Procurement Code, Section 63G-6-602.

SC-11.02 Insert the following new subparagraphs immediately following Paragraph 11.02.A.4:

5. In signing a Change Order, the Owner and Contractor acknowledge and agree that:
 - a. the stipulated compensation (Contract Price or Contract Times, or both) set forth in the Change Order includes not only all direct costs of Contractor such as labor, material, job overhead, and profit markup, but also includes any costs for modifications or changes in sequence of work to be performed, delays, rescheduling, disruptions, extended direct overhead or general overhead, acceleration, material or other escalation which includes wages and other impact costs. This Document will become a supplement to the Contract and all Contract provisions will apply hereto. It is understood that this Change Order shall be effective on the date approved by the Owner's Representative;
 - b. the Change Order constitutes full mutual accord and satisfaction for the change to the Work;
 - c. no reservation of rights to pursue subsequent claims on the Change Order will be made by either party; and
 - d. no subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order.

11.08 Change of Contract Times

SC-11.08 Add the following new paragraphs immediately after Paragraph 11.08.B:

C. Use of Float:

1. A request for adjustment of Contract Times (or Milestones), otherwise allowable under the Contract Documents, shall be granted only when the time lost or gained exceeds the float for the activity at the time of the event giving rise to the claim. Float, the amount of time between the early start date and the late start date, or the early finish date and the late finish date, is jointly owned by both Owner and Contractor whether expressly disclosed or implied in any manner.
2. Contractor shall not use float suppression techniques (including, but not limited to, preferential sequencing caused by late starts of follow-up trades, unreasonably small crews, extended durations, or imposed dates) in information provided to Engineer.

D. Weather Days:

1. The Contract Time includes a weather day allowance of 7 working days. No extension in Contract Time will be allowed for the first 7 working days lost due to weather conditions.

ARTICLE 12 — CLAIMS (NOT USED)

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

13.01 Cost of the Work

SC-13.01 Adding the following new language at the end of Paragraph 13.01.B.5.c.2:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of Rental Rate Blue Book.

SC-13.01 Adding the following new language at the end of Paragraph 13.01.C.2:

- a. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than \$1000.

13.03 Unit Price Work

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

E. Adjustments in Unit Price:

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the extended price of a particular item of Unit Price Work amounts to 25 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
 - c. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
 - d. Adjusted unit prices will apply to all units of that item.

ARTICLE 14 — TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK (NOT USED)

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

15.01 Progress Payments

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

1. At least 30 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.

- a. Payments for stored materials and equipment shall be based only upon the actual cost of the materials and equipment to Contractor and shall not include any overhead or profit to Contractor. Partial payments will not be made for undelivered materials or equipment, except for payments associated with prepurchase vendor contracts initiated by Owner and assigned to Contractor.

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

1. 30 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.

15.03 Substantial Completion

SC-15.03 Add the following new subparagraphs immediately after Paragraph 15.03.A:

1. The Work shall be Substantially Complete when the Work can treat water to required quality and transmit water in the quantity in accordance with the Contract Documents. All process and transmission equipment shall be installed and operational, or temporary arrangements satisfactory to Owner shall have been made. Operational testing must be completed prior to the date of Substantial Completion.
2. To be considered substantially complete, the following portions of the Work must be operational and ready for Owner's continuous use as intended:
 - a. 48-inch sanitary sewer line is operational.
 - b. Weber River restored to normal.
 - c. Open field is backfilled
3. Portions of the Work not essential to plant operation, which can be completed without interruption of plant operation, may be completed after the Work is accepted as Substantially Complete, and may include the following items:
 - a. Final grading
 - b. Punch list items.

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

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

15.05 Final Inspection

SC-15.05 Add the following new paragraph immediately after Paragraph 15.05.A:

1. If some or all of the Work has been determined not to be at a point of Final Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or

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

15.08 Correction Period

SC-15.08 Delete Paragraph 15.08.B. in its entirety.

SC-15.08 Delete Paragraph 15.08.C. in its entirety and insert the following in its place:

- B. If, after receipt of a notice of defect Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including, but not limited to, all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

ARTICLE 16 — SUSPENSION OF WORK AND TERMINATION (NOT USED)

ARTICLE 17 — FINAL RESOLUTION OF DISPUTES (NOT USED)

ARTICLE 18 — MISCELLANEOUS (NOT USED)

END OF DOCUMENT

DOCUMENT 00823

ESCROW BID DOCUMENTS

ARTICLE 1—SCOPE

- 1.01 The 3 lowest Bidders shall submit, within the specified time after receipt of Bids, 1 copy of all documentary information generated in preparation of Bid prices for this Project. This material is hereinafter referred to as "Escrow Bid Documents." The Escrow Bid Documents of the Successful Bidder will be held in escrow for the duration of the contract.
- 1.02 The Successful Bidder agrees, as a condition of award of the contract, that the Escrow Bid Documents constitute the complete, only, and all documentary information used in preparation of his Bid. No other Bid preparation information shall be considered in resolving disputes.
- 1.03 Nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract Documents.

ARTICLE 2—OWNERSHIP

- 2.01 The Escrow Bid Documents are, and shall always remain, the property of Contractor, subject only to joint review by Owner and Contractor, as provided in this Document.
- 2.02 Owner stipulates and expressly acknowledges that the Escrow Bid Documents, as defined in this Document, constitute trade secrets. This acknowledgment is based on Owner's express understanding that the information contained in the Escrow Bid Documents is not known outside the Bidder's business, is known only to a limited extent and only by a limited number of employees of the Bidder, is safeguarded while in Bidder's possession, is extremely valuable to Bidder, and could be extremely valuable to Bidder's competitors by virtue of it reflecting Bidder's contemplated techniques of construction. Owner acknowledges that the Bidder expended substantial sums of money in developing the information included in the Escrow Bid Documents and further acknowledges that it would be difficult for a competitor to replicate the information contained therein. Owner further acknowledges that the Escrow Bid Documents and the information contained therein are made available to Owner only because such action is an express prerequisite to award of the contract. Owner further acknowledges that the Escrow Bid Documents include a compilation of information used in the Bidder's business, intended to give the Bidder an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. Owner agrees to safeguard the Escrow Bid Documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

ARTICLE 3—PROGRAM

- 3.01 Escrow Bid Documents will be used to assist in the negotiation of price adjustments and Change Orders and in the settlement of disputes, claims, and other controversies. They will not be used for pre-award evaluation of Contractor's anticipated methods of construction or to assess Contractor's qualifications for performing the Work.

ARTICLE 4—FORMAT AND CONTENTS

- 4.01 Bidders may submit Escrow Bid Documents in their usual cost-estimating format. It is not the intention of this section to cause the Bidder extra work during the preparation of the Bid, but to ensure that the Escrow Bid Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Escrow Bid Documents shall be in the language of the Specifications.
- 4.02 It is required that the Escrow Bid Documents clearly itemize the estimated costs of performing the work of each Bid item contained in the Bid schedule. Bid items should be separated into subitems as required to present a complete and detailed cost estimate and allow a detailed cost review. The Escrow Bid Documents shall include all quantity takeoffs; crew; equipment; calculations of rates of production and progress; copies of quotations from equipment manufacturers, Subcontractors, and Suppliers; and memoranda, narratives, consultants' reports, add/deduct sheets, and all other information used by the Bidder to arrive at the prices contained in the Bid Form. Estimated costs should be broken down into the Bidder's usual estimate categories, such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Bidder's usual format. Contractor's allocation of plant and equipment, indirect costs, contingencies, markup, and other items to each Bid item shall be included.
- 4.03 All costs shall be identified. For Bid items amounting to less than \$10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included, and provided that indirect costs, contingencies, and markup, as applicable, are allocated.
- 4.04 Bidding Documents provided by the Owner should not be included in the Escrow Bid Documents unless needed to comply with the requirements of this section.

ARTICLE 5—SUBMITTAL

- 5.01 The Escrow Bid Documents shall be submitted in a sealed container within 48 hours after the time of receipt of Bids. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, project name, and the words "Escrow Bid Documents."
- 5.02 The Escrow Bid Documents shall be accompanied with the completed Attachment A Certificate of Bid Documentation, signed by an individual authorized by the Bidder to execute the Bid Form, stating that the material in the Escrow Documentation constitutes the complete, only, and all documentary information used in preparation of the Bid and that he has personally examined the contents of the Escrow Bid Documents container and has found that the documents in the container are complete.
- 5.03 Prior to award, Escrow Bid Documents of the apparent Successful Bidder will be unsealed, examined, organized, and inventoried by representatives of Owner, together with members of Contractor's staff who are knowledgeable in how the Bid was prepared.
- 5.04 This examination is to ensure that the Escrow Bid Documents are authentic, legible, and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of Contract Documents. This examination is subject to the condition that, as trade secrets, the Escrow Bid Documents are proprietary and confidential as described in this Document. Examination will not alter any condition(s) or term(s) of the contract.

- 5.05 If all the documentation required in this Document has not been included in the original submittal, additional documentation shall be submitted, at Owner's discretion, prior to award of the contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between Contractor and Owner before making the award.
- 5.06 If the contract is not awarded to the apparent Successful Bidder, the Escrow Bid Documents of the Bidder next to be considered for award shall be processed as described above.
- 5.07 Timely submission of complete Escrow Bid Documents is an essential element of the Bidder's responsibility and a prerequisite to contract award. Failure to provide the necessary Escrow Bid Documents will be sufficient cause for Owner to reject the Bid.
- 5.08 If the Bidder's proposal is based on subcontracting any part of the Work, each Subcontractor whose total subcontract price exceeds 5 percent of the total Contract Price proposed by the Bidder shall provide separate Escrow Bid Documents to be included with those of the Bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent Successful Bidder.
- 5.09 If Contractor subcontracts any portion of the Work after award, Owner retains the right to require Contractor to submit Escrow Bid Documents from the Subcontractor before the subcontract is approved.
- 5.10 Escrow Bid Documents submitted by unsuccessful Bidders will be returned unopened, unless opened as provided above, as soon as they are no longer needed by Owner and no later than immediately following award of the contract.

ARTICLE 6—STORAGE

- 6.01 The Escrow Bid Documents of the Successful Bidder will be placed in escrow prior to award of the contract, for the life of the contract, in a mutually agreeable institution. The cost of storage will be paid by Owner.

ARTICLE 7—EXAMINATION AFTER AWARD OF CONTRACT

- 7.01 The Escrow Bid Documents shall be examined by both Owner and Contractor, at any time deemed necessary after award of the contract by either Owner or Contractor, to assist in the negotiation of price adjustments and Change Orders, or the settlement of disputes.
- 7.02 Examination of the Escrow Bid Documents after award of the contract is subject to the following conditions:
- 7.03 As trade secrets, the Escrow Bid Documents are proprietary and confidential as described in this Document.
- 7.04 Owner and Contractor shall each designate, in writing to the other party and a minimum of 10 days prior to examination, representatives who are authorized to examine the Escrow Bid Documents. No other person shall have access to the Escrow Bid Documents.
- 7.05 Access to the Escrow Bid Documents will take place only in the presence of duly designated representatives of both Owner and Contractor.

ARTICLE 8—FINAL DISPOSITION

8.01 The Escrow Bid Documents will be returned to Contractor at such time as the contract has been completed and final settlement has been achieved.

END OF DOCUMENT

ATTACHMENT A - CERTIFICATE OF BID DOCUMENTATION

CERTIFICATE OF BID DOCUMENTATION

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THE BID DOCUMENTATION CONTAINED IN THIS DOCUMENT CONSTITUTES THE COMPLETE, ONLY, AND ALL DOCUMENTARY INFORMATION USED IN PREPARATION OF THE BID AND THAT I HAVE PERSONALLY EXAMINED THESE CONTENTS AND HAVE FOUND THAT THIS BID DOCUMENTATION IS COMPLETE.

BY: _____

TITLE: _____

FIRM: _____

DATE: _____

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
1. Detailed description of the Work.

1.02 THE WORK

- A. The Work consists of:
1. Construction of new 48-inch gravity sewer pipe and manhole. A portion of the new sewer pipe includes crossing the Weber River. Work includes demolition of existing pipe, bedding material and backfill material for installation of new pipe and manhole, dewatering, bypass pumping, and field pipe connections.
 2. Pipe material will be bid as different options for the Owner. Option #1 is FRMPM pipe with concrete encasement for the Weber River Crossing. Option #2 is HPDE pipe with steel casing for the River crossing.
 3. Restoration of disturbed Weber River bottom and banks.
 4. Testing, commission and startup of new gravity sewer line.

1.03 LOCATION OF PROJECT

- A. The Work is located in Weber County, west of CWSID North Weber River Lift Station. Owners of property include a private owner and CWSID.

1.04 ACTIVITIES BY OTHERS

- A. Activities by others which may affect performance of work include:
1. None.

1.05 PARTIAL USE OR OCCUPANCY (NOT USED)

1.06 ALTERNATES

- A. See Specification 01230 - Alternates.

1.07 PRODUCTS (NOT USED)

END OF SECTION

SECTION 01116

CONTRACT DOCUMENT LANGUAGE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Explanation of arrangement, language, reference standards, and format.

1.02 REFERENCES

- A. Construction Specifications Institute (CSI):
 1. MasterFormat™.
 2. SectionFormat™.
 3. PageFormat™.

1.03 PROJECT MANUAL ARRANGEMENT

- A. Document and Section numbers used in Project Manual, and Project Manual arrangement are in accordance with CSI MasterFormat™, except where departures have been deemed necessary.
- B. Sections are written in CSI SectionFormat™, Three-Part Section Format, except where departures have been deemed necessary.
- C. Page format for Sections in the Project Manual is in PageFormat™, except where departures have been deemed necessary.

1.04 CONTRACT DOCUMENT LANGUAGE

- A. Specification Section Paragraphs entitled "Section Includes" summarize briefly what is generally included in the section.
 1. Requirements of Contract Documents are not limited by "Section Includes" paragraphs.
- B. Specifications have been partially streamlined by intentionally omitting words and phrases, such as "the Contractor shall," "in conformity therewith," "shall be" following "as indicated," "a," "an," "the" and "all."
 1. Assume missing portions by inference.
- C. Phrase "by Engineer" modifies words such as "accepted," "directed," "selected," "inspected," and "permitted," when they are unmodified.
- D. Phrase "to Engineer" modifies words such as "submit," "report," and "satisfactory," when they are unmodified.

- E. Colons (:) are used to introduce a list of particulars, an appositive, an amplification, or an illustrative quotation:
 - 1. When used as an appositive after designation of product, colons are used in place of words "shall be."
- F. Word "provide" means to manufacture, fabricate, deliver, furnish, install, complete, assemble, erect in place, test, or render ready for use or operation, including necessary related material, labor, appurtenances, services, and incidentals.
- G. Words "Contractor shall" are implied when direction is stated in imperative mood.
- H. Term "products" includes materials and equipment as specified in Section 01601 - Product Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01140
WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for sequencing and scheduling the Work affected by existing site and facility, work restrictions, and coordination between construction operations and collections operations.

1.02 SUBMITTALS

- A. Baseline Schedule with MOP tasks.
- B. Method of Procedure (MOP) Form.
- C. Method of Procedure (MOP) Log.
- D. Progress Schedule with MOP tasks.

1.03 METHOD OF PROCEDURE (MOP)

- A. Comply with MOP Instructions as specified in Attachment A - Method of Procedure (MOP).
- B. Prepare MOP for the following conditions:
 - 1. Shutdowns, diversions (bypass pumping), and tie-ins to the existing facility or manholes.
 - 2. Power interruption and tie-ins.
 - 3. River crossing construction and sequencing.
- C. Other Work not specifically listed may require MOPs as determined necessary by the Contractor, Owner, or Engineer.
- D. Submit MOP Log at construction progress meetings.
- E. No consideration will be given to claims of additional time and cost associated to preparing MOPs required by the Owner and Engineer to complete this work in a manner that facilitates proper operation of the facility and compliance with effluent discharge criteria.
- F. Where required to minimize treatment process interruptions while complying with specified constraints, provide temporary pumping, power, lighting, controls, instrumentation, and safety devices.

1.04 GENERAL CONSTRAINTS ON WORK AND SCHEDULING OF WORK

- A. Temporary access and easements onto private property will need to be coordinated and permitted by the Contractor with the Property Owner.
- B. Sewer Collection Projects:
 - 1. The sewer collection pipe is the only means of delivering raw wastewater from the West Weber area to CWSID's wastewater treatment facility. Impairing the operational capabilities of the gravity sewer line will result in serious environmental damage and monetary fines.
 - 2. Conduct commissioning activities as specified in Section 01756 - Commissioning in a manner that will not impair the operational capabilities of essential elements of the collection system at this location or reduce the capacity of the sewer line.

1.05 UTILITIES

- A. Provide advance notice to and utilize services of Blue Stake for location and marking of underground utilities operated by utility agencies other than the Owner.
- B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.
- C. New yard utilities were designed using existing facility drawings.
 - 1. Field verification of utilities locations was not performed during design.
 - 2. Services crossed or located nearby by new yard utilities may require relocation and possible shutdowns.
 - 3. Pipe alignments as indicated on the Drawings.

1.06 WORK BY OTHERS

- A. Where proper execution of the Work depends upon work by others, inspect and promptly report discrepancies and defects.

1.07 SHUTDOWN CONSTRAINTS

- A. General shutdown constraints:
 - 1. Execute the Work while the existing lift station is in operation.
 - 2. All activities may be accomplished without a shutdown of the lift station

1.08 WORK RESTRICTIONS

- A. Existing easement parameters for new sewer collection pipe are shown on the drawings. Conduct work within easement lines. Temporary easements distances shown. Contractor is responsible for all temporary entrance and construction easements with coordination of Landowner.
- B. Do not disturb or affect raptor or bald eagle nests if encountered during construction.

- C. River Crossing Section Restrictions:
1. Project timeframe and work are scheduled to be during winter low flow river conditions. Weber Basin Water Conservancy District often releases water from upstream reservoirs in preparation for spring run-off. Water levels may also increase during repair work on the Willard Canal and more flow is diverted to the Weber River. Contractor to coordinate with Weber Basin Conservancy District to be aware of any scheduled upstream releases or repair work timeframe of the canal.
 2. Per permitting with US Army Corps of Engineers (USACE), contractor is required to minimize all impacts to existing river bottom and banks. The maximum allowable river bottom and bank impacts are limited to 40 feet of each side of pipe centerline. Total of 80 feet. This includes coffer dams, dewatering river, and other means and methods to divert flow for open cut of the Weber River.
 3. Maximum excavation and trenching widths for demolition and installation of new piping is 15 feet from centerline on each side of pipe. Contractor to use trench boxes and other construction methods for trenching/excavation to limit impacts.
 4. All work within the Weber River to be completed within an 8 to 10 week period.
- D. Open Field Pipe Section Restrictions:
1. Before pipe excavation and install of new 48-inch SS line, contractor to excavate for SSMH #1 manhole and inspect condition of existing 48-inch SS line near riverbank. Dependent upon condition of existing pipe, inspected by Engineer and Owner; at the Owners option and discretion, the installation of the new 48-inch SS pipe through the field from SSMH#2 and SSMH#1 may be removed from the project.
 2. Open cut for pipe demolition and install in open field is limited to the limits of construction shown on the drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

ATTACHMENT A - METHOD OF PROCEDURE (MOP)

**“METHOD OF PROCEDURE” (MOP)
Instructions and Forms**

Definition and Purpose

“Method of Procedure” (MOP) is a detailed document submitted by the Contractor to request process shutdown(s), utility tie-in(s), work in areas that may risk unanticipated outages, or flow diversions to accommodate site construction activities during a project. Such activities may include (but are not limited to) new tie-ins to utilities or structures, mechanical modifications to process piping or equipment, demolition, bulkhead installation, and cleaning processes.

The MOP provides a detailed plan to the Owner and Engineer that describes specific aspects of the work including purpose, time of execution, and anticipated impacts on treatment processes. The MOP also includes contingency measures and provisions for rapid closure in the event that shutdown or work progress difficulties are encountered. Information from relevant trades associated with the requested shutdown, diversion, or tie-in is also included.

The Owner should use the information within the MOP to define operational procedures and methods to safely and successfully assist the Contractor.

MOP Process Summary

WHO	STEP	TIMING
Contractor	1. Identify MOPs needed on MOP Log and Baseline Schedule.	No later than 7 days prior to Preconstruction Scheduling Meeting
Contractor, Owner, Engineer	2. Pre-MOP Meeting.	More than 28 days prior to work
Contractor	3. Submits MOP.	No later than 28 days prior to work
Owner	4. Reviews MOP.	
Owner	5. MOP finalized.	No later than 7 days prior to work
Contractor	6. Complete Readiness Checklist.	No later than 5 days prior to work
Contractor	7. Complete Safety Checklist.	Immediately prior to commencing work
Contractor	8. Complete Work.	
Contractor	9. Update MOP Log and Progress Schedules.	Monthly

MOP Process Detail

STEP 1. Identifies MOPs needed on MOP Log and Baseline Schedule.

Contractor submits a preliminary list of anticipated project MOPs on MOP Log. MOPs identified but not limited to those shutdowns, diversions, or tie-ins described in the Contract Documents. Incorporate MOPs as tasks in Baseline Schedule. Date scheduled MOPs to coincide with the appropriate construction activities.

STEP 2. Pre-MOP Meeting.

Contractor requests a Pre-MOP Meeting with the Owner and Engineer to discuss the nature of the shutdown, diversion, or tie-in, and to gather the information necessary to complete the MOP Form. The pre-MOP meeting may be waived by the Owner or Engineer if the work is deemed to be minor.

STEP 3. Submits MOP.

Contractor completes the MOP Form and submits 3 copies for approval to the Owner's Project Manager (OPM).

STEP 4. Reviews MOP.

OPM distributes MOP Form for review by the Owner's Construction Coordinator, O&M Representative, and Engineer's Project Representative. Review MOP Form for completeness, accuracy, compliance with both the construction schedule, constraints defined in Contract Documents, and to ensure that the requested work does not negatively impact plant operations or other concurrent project activities. Additional information may be requested to better understand the nature of and method for completing the Work.

STEP 5. MOP finalized.

Once the MOP is agreed to by all parties, the MOP will be finalized by signature. Copies are distributed to the Owner, Engineer, and Contractor.

STEP 6. Complete Readiness Checklist.

Contractor verifies everything is ready for the Work.

STEP 7. Complete Safety Checklist.

Contractor ensures safety.

STEP 8. Complete Work.

Contractor completes Work.

STEP 9. Update MOP Log and Progress Schedules.

Contractor updates MOP Log weekly and distributes at the regularly scheduled construction progress meetings.

ATTACHMENT B - METHOD OF PROCEDURE (MOP) FORM



METHOD OF PROCEDURE (MOP) FORM

Owner: _____ Date: _____
 Contractor: _____ Carollo Project No.: _____
 Project Name: _____ Submittal No.: _____
 Submittal Title: _____ Spec/Drawing. Ref.: _____

MOP #:	TASK TITLE: <i>(Provide <10 word title)</i>	SUBMITTAL DATE: <i>(No later than 28 days prior to work)</i>
--------	---	---

SCHEDULE OF WORK ACTIVITY:
 START: *(Date/Time)* _____ END: *(Date/Time)* _____

REQUESTOR: _____

PRIMARY POINT OF CONTACT: _____ PHONE/PAGER: _____

SECONDARY POINT OF CONTACT: _____ PHONE/PAGER: _____

NOTIFY: Control Room, Phone: _____ Security, Phone: _____

BUILDING: _____ LOCATION OF WORK FLOOR/LEVEL: _____

DESCRIPTION OF WORK: *(Provide sufficient details on process isolation, work sequencing, and safety (i.e. control of significant hazards unique to the work) to demonstrate an understanding of the work and how it will be completed within the constraints, and its impact on the processes and facility.)*

Task Summary: _____

Processes Affected: _____

Trades Affected: _____

WORK PLAN:

Work Sequencing: _____

Process Isolation: _____

Spill Prevention Plan: _____

Contingency Plans: _____

CRITICAL EQUIPMENT / TOOLS: *(Pumps and discharge hoses with correct fittings, blind flanges and pipe plugs, no-hub fittings, properly sized electrical service components, generators, portable lighting, chlorine for potable water pipe breaks, etc.)*

<input type="checkbox"/>	Acoustic Ceiling/or Walls Access	<input type="checkbox"/>	Excavation Permit	<input type="checkbox"/>	Lock Out/Tag Out
<input type="checkbox"/>	Chemical Use Approval	<input type="checkbox"/>	Fire Sprinkler Impairment	<input type="checkbox"/>	Life Safety Systems
<input type="checkbox"/>	Confined Space Permit	<input type="checkbox"/>	Flammable Materials	<input type="checkbox"/>	Roof Protocol
<input type="checkbox"/>	Critical Lift Plan	<input type="checkbox"/>	Flush / Discharge	<input type="checkbox"/>	Work After Dark
<input type="checkbox"/>	Energized Electrical Work	<input type="checkbox"/>	High Pressure Test	<input type="checkbox"/>	
<input type="checkbox"/>	Elect. Panel Schedules	<input type="checkbox"/>	Hot Work/Open Flame	<input type="checkbox"/>	

EXISTING SERVICE(S) AT RISK:							
<input type="checkbox"/>	Breathing Air	<input type="checkbox"/>	Elect Normal	<input type="checkbox"/>	Process Access	<input type="checkbox"/>	Telephones
<input type="checkbox"/>	Chemical Distribution	<input type="checkbox"/>	Fire Protection	<input type="checkbox"/>	Safety Showers	<input type="checkbox"/>	UPS
<input type="checkbox"/>	City Water	<input type="checkbox"/>	HVAC	<input type="checkbox"/>	SCADA	<input type="checkbox"/>	VAX/DATA
<input type="checkbox"/>	Communication	<input type="checkbox"/>	Inert Gas	<input type="checkbox"/>	Security	<input type="checkbox"/>	
<input type="checkbox"/>	Domestic Drain	<input type="checkbox"/>	Instrument - Air	<input type="checkbox"/>	Solvent Drain	<input type="checkbox"/>	
<input type="checkbox"/>	Elect-Bus Duct	<input type="checkbox"/>	Life Safety System	<input type="checkbox"/>	Specialty Gases	<input type="checkbox"/>	
<input type="checkbox"/>	Elect. Emergency	<input type="checkbox"/>	Natural Gas	<input type="checkbox"/>	Storm Drain	<input type="checkbox"/>	
REVIEWER'S INSTRUCTIONS/COMMENTS: _____							
<input type="checkbox"/> PREJOB BRIEFING MUST BE COMPLETED PRIOR TO COMMENCING WORK:							
	Full Name (printed)	Signature	Phone	Date			
Submitted By							
System Owner							
Reviewer (if needed)							
Reviewer (if needed)							
Reviewer (if needed)							
Reviewer (if needed)							

ATTACHMENT C - READINESS CHECKLIST

READINESS CHECKLIST
(5 days prior to work)

Checklist provided as a guide but is not all inclusive.

1. Confirm all parts and materials are on site: _____

2. Review work plan: _____

3. Review contingency plan: _____

ATTACHMENT D - SAFETY CHECKLIST

SAFETY CHECKLIST

(Just prior to commencing work)

Checklist provided as a guide but is not all inclusive.

1. Location awareness:
 - a. Emergency exits: _____
 - b. Emergency shower and eyewash: _____
 - c. Telephones and phone numbers: _____
 - d. Shut-off valve: _____
 - e. Electrical disconnects: _____
2. Inspect work area:
 - a. Take time to survey the area you are working in. Ensure that what you want to do will work. Do you have enough clearance? Is your footing secure? Do you have adequate lighting and ventilation? Are surrounding utilities out of the way for you to perform your work?
3. SDS (Safety Data Sheets):
 - a. Understand the chemicals and substances in the area you are working in by reading the SDS.
4. Lockout/Tagout Procedure:
 - a. Lockout/tagout energy sources before beginning work.
 - b. Make sure all valves associated with the work are locked out and tagged out on each side of the penetration.
 - c. Make sure the lines are depressurized.
5. Overhead work:
 - a. Use appropriate personal protective equipment; i.e., safety harness, lifeline, etc.
 - b. Select appropriate tie-off points; i.e., structurally adequate, not a pipe or conduit, etc.
 - c. Spotter assigned and in position.
 - d. Pipe rack access; i.e., check design capacity, protective decking or scaffolding in place, exposed valves or electrical switches identified and protected.
6. Safety equipment:
 - a. Shepherd's hook.
 - b. ARC flash protection.
 - c. Fire extinguisher.
 - d. Other: _____
7. Accidents:
 - a. Should accidents occur, do not shut off and do not attempt to correct the situation unless you are absolutely positive that your action will correct the problem and not adversely affect other people or equipment.
8. Review process start-up documents:
 - a. In the event the system is shutdown, the Control Center should have a working knowledge of the process start-up procedures in order to deal effectively with unforeseen events.
9. Evacuation procedures:
 - a. Do not obstruct evacuation routes.
 - b. Take time to survey the area for evacuation routes.

ATTACHMENT E - METHOD OF PROCEDURE (MOP) LOG

METHOD OF PROCEDURE (MOP) LOG
Sample

MOP Number	Task Title	Date Requested	Date Approved	Date Work Planned	Work Completed (Yes/No)
001					
002					
003					

SECTION 01220

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Procedures for measurement and payment of Work under this Contract for lump sum items and unit prices.

1.02 LUMP SUM ITEMS

- A. Item 1: Lump sum Item for Option #1 and Option #2.
 - 1. Measurement:
 - Includes all costs as described in the contract documents, excluding unit costs. Cost also includes Contractor's fee for overhead and profit for continuous, full-time management of the Contract as described in the Contract Documents, covering a period of time not less than from the Notice to Proceed through the entire length of the allowable Contract Times specified in the Contract Documents. Includes costs for mobilization and demobilization activities, installation of new SSMH#1, and bypass pumping.
 - 2. Payment:
 - a. Lump sum.

1.03 UNIT PRICE ITEMS

- A. Measurement of quantities:
 - 1. Work paid at a unit price times number of units measured will be measured by Engineer in accordance with United States Standard Measures:
 - a. 1 ton shall consist of 2,000 pounds avoirdupois.
 - 2. Provide and pay for accurate scales:
 - a. Use platform scales of sufficient size and capacity to permit the entire vehicle or combination of vehicles to rest on the scale platform while being weighed.
 - b. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed.
 - c. Have scales inspected and certified as often as necessary to ascertain accuracy.
 - d. Furnish weigh slips and daily summary weigh sheets to Engineer.
 - e. When material is shipped by rail, certified car weights will be acceptable, provided that not more than the actual weight of material will be paid, without consideration of minimum car weight used for assessing freight tariff:
 - 1) Car weight will not be acceptable for materials passing through mixing plants.

- f. Daily, or at shorter intervals when necessary to ensure accuracy, weigh empty trucks used to haul material paid by weight:
 - 1) Provide such trucks with plain, unique, permanent, legible identification marks.
 - 3. Reinforcing steel, steel shapes, castings, and similar items paid by weight will be measured by handbook weights for the type and quantity indicated for the Work.
- B. For Table 1A - Unit Price Bids for Option #1:
 - 1. Item 1: Installation of new SS 48-inch FRPMP pipe from existing SSMH #2 to SSMH #1:
 - a. Measurement:
 - 1) Includes total cost for open cut installation of new 48-inch FRPMP pipe. Include all ancillary costs such as; excavation, trenching and shoring, demolition and proper disposal of existing pipe, pipe install and testing, trench plugs, pipe embedment zone backfill, dewatering, trench backfill and compaction.
 - 2) Includes work for completely restoring property affected by construction operations to its original or required condition, preliminary grading, placement of topsoil, fine grading, grass sodding or seeding (if required) and final cleanup including removal of stormwater pollution prevention systems and removal of equipment or materials related to construction.
 - b. Payment:
 - 1) Measurement for payment shall be based on the unit price per linear foot installed.
 - 2. Item 2: Installation of new SS 48-inch FRPMP pipe from SSMH #1 to existing pipe connection near vault.
 - a. Measurement:
 - 1) Includes total cost for open cut installation of new 48-inch FRPMP pipe through River crossing section. Include all ancillary costs such as; excavation, trenching and shoring, river diversion, demolition and proper disposal of existing pipe, pipe install and testing, dewatering, concrete encasement, concrete collar connection, stabilization, trench backfill and compaction.
 - 2) Includes work for completely restoring Weber River banks and stream bed affected by construction operations to its original or required condition, including fence replacement, placement of river bed material, seeding and final cleanup including removal of stormwater pollution prevention systems and removal of equipment or materials related to construction.
 - b. Payment:
 - 1) Measurement for payment shall be based on the unit price per linear foot installed.
- C. For Table 1B - Unit Price Bids for Option #2:
 - 1. Item 1: Installation of new SS 48-inch HPDE pipe from existing SSMH #2 to SSMH #1:
 - a. Measurement:
 - 1) Includes total cost for open cut installation of new 48-inch HPDE pipe. Include all ancillary costs such as; excavation, trenching and

- shoring, demolition and proper disposal of existing pipe, dewatering, pipe install and testing, trench plugs, pipe embedment zone backfill, trench backfill and compaction.
- 2) Includes work for completely restoring property affected by construction operations to its original or required condition, preliminary grading, placement of topsoil, fine grading, grass sodding or seeding (if required) and final cleanup including removal of stormwater pollution prevention systems and removal of equipment or materials related to construction.
- b. Payment:
 - 1) Measurement for payment shall be based on the unit price per linear foot installed.
2. Item 2: Installation of new SS 48-inch HDPE pipe from SSMH #1 to existing pipe connection near vault.
 - a. Measurement:
 - 1) Includes total cost for open cut installation of new 48-inch HPDE pipe through River crossing section. Include all ancillary costs such as; excavation, trenching and shoring, river diversion, demolition and proper disposal of existing pipe, dewatering, install of steel casing, pulling fused HPDE pipe through casing and testing, void space fill, pipe connection to existing HDPE pipe, pipe embedment zone backfill, stabilization, trench backfill and compaction.
 - 2) Includes work for completely restoring Weber River banks and stream bed affected by construction operations to its original or required condition, including fence replacement, placement of river bed material, seeding and final cleanup including removal of stormwater pollution prevention systems and removal of equipment or materials related to construction.
 - b. Payment:
 - 1) Measurement for payment shall be based on the unit price per linear foot installed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01230

ALTERNATES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Identification and description of Alternates.

1.02 PROCEDURES

- A. Alternates will be exercised at Owner's option.
- B. Coordinate related work and modify surrounding work as required to complete the Work, including changes under Alternates accepted by Owner in Notice of Award.

1.03 ALTERNATES

- A. Alternates - Pipe Material Alternates:
 - 1. Option #1: Open cut FRPMP pipe with concrete encasement through River Crossing.
 - 2. Option #2: Open cut HDPE pipe with steel casing through River Crossing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01260

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for executing a change in the Work.

1.02 PRELIMINARY REQUIREMENTS

- A. Change Order Cost Basis Summary Form:
 - 1. Submit a sample to Engineer for review within 15 calendar days following Notice to Proceed.
 - a. Items will be reviewed and their value, percentage, or calculation method mutually agreed to by the Contractor and Owner prior to executing a Change Order on the Project.
 - 2. Used by the Contractor for pricing each Change Order required for additions, deletions, or revisions in the Work.
 - 3. Include the following information:
 - a. Agreed upon markups, percentages, and procedures for calculating all surcharges, etc. associated with the Cost of the Change Order Work.
 - b. References for unit price information and special unit price information.
 - c. Attachments with the following information:
 - 1) Certified labor rates breakdown.
 - 2) Equipment rates.
 - 3) Bond and insurance rates (PI&I).

1.03 REQUEST FOR INFORMATION OR INTERPRETATION (RFI)

- A. Contractor may issue RFIs to request interpretation of the documents or to request for information that may be missing.
- B. General Instructions:
 - 1. Number RFIs consecutively.
 - a. Add a consecutive letter to the RFI number on modified submittals of the same RFI (i.e., RFI 4B).
 - 2. Provide RFI for 1 item.
 - a. There may be exceptions when multiple items are so functionally related that expediency indicates review of the group of items as a whole.
 - b. RFIs with multiple items will be rejected without review.
 - 3. Contractor sign and date RFIs indicating review and approval.
 - a. Contractor's signature indicates that they have satisfied RFI review responsibilities and constitutes Contractor's written approval of RFI.

- b. RFIs without Contractor's signature will be returned to the Contractor unreviewed. Subsequent submittal of this information will be counted as the first resubmittal.
- C. Engineer will render a written clarification, interpretation, or decision on the issue submitted or initiate an amendment or supplement to the Contract within 21 days.
 - 1. In the event the Contractor identifies an RFI as critical to the progress of the project, Engineer will make every effort to reduce the RFI response time.

1.04 PRELIMINARY PROCEDURES

- A. Owner or Engineer may initiate changes by submitting a Request for Proposal (RFP) to Contractor including the following information:
 - 1. Detailed description of the Change, Products, and location of the change in the Project.
 - 2. Supplementary or revised drawings or specifications.
 - 3. Projected time span for making the change, and a specific statement if overtime work is authorized.
 - 4. A specific period of time during which the requested price will be considered valid.
 - 5. Such request is for information only, and is not an instruction to execute the changes, or to stop work in progress.
- B. Contractor may initiate changes by submitting a Change Proposal to Engineer containing the following:
 - 1. Description of proposed changes.
 - 2. Reason for making changes.
 - 3. Specific period of time during which requested price will be considered valid.
 - 4. Effect on Total Contract Cost and/or Contract Time.
 - 5. Documentation supporting any change in Total Contract Cost and/or Contract Time, as appropriate.

1.05 WORK CHANGE DIRECTIVE AUTHORIZATION

- A. In lieu of a Request for Proposal (RFP), Engineer may issue a Work Change Directive Authorization for Contractor to proceed with a change for subsequent inclusion in a Change Order.
- B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate method of determining any change in the Contract Sum and/or the Contract Time, as appropriate.
- C. Owner and Engineer will sign and date the Work Change Directive Authorization as authorization for the Contractor to proceed with the changes.
- D. Contractor may sign and date the Work Change Directive Authorization to indicate agreement with the terms.

1.06 DOCUMENTATION OF CHANGE PROPOSALS

- A. Change proposal:
 - 1. Support with sufficient substantiating data to allow Engineer to evaluate the quotation.
 - a. Lump sum.
 - b. Unit prices: Use previously established unit prices.
 - c. Time-and-material/force account basis:
 - 1) Name of the Owner's authorized agent who ordered the work, and date of the order.
 - 2) Dates and times work was performed, and by whom.
 - 3) Time record, summary of hours worked, and hourly rates paid.
 - 4) Receipts and invoices for:
 - a) Equipment used, listing dates and times of use.
 - b) Products used, listing of quantities.
 - c) Subcontracts.
 - 2. Provide additional data to support time and cost computations:
 - a. Labor required.
 - b. Equipment required.
 - c. Products required:
 - 1) Recommended source of purchase and unit cost.
 - 2) Quantities required.
 - d. Taxes, insurance, and bonds.
 - e. Credit for work deleted from Contract, similarly documented.
 - f. Overhead and profit.
 - g. Justification for change to Contract Time.

1.07 PREPARATION OF CHANGE ORDERS AND FIELD ORDERS

- A. Engineer will prepare each Change Order and Field Order.
- B. Change Orders:
 - 1. Will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
 - 2. Will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
 - 3. Recommendation of Change Proposal is indicated by Engineer's signature.
 - 4. Upon signature and execution by Owner, the Change Proposal becomes a Change Order altering the Contract Time and Total Contract Cost, as indicated.
 - a. Owner's Representative will transmit one signed copy each to Contractor and Engineer.
 - 5. Contractor may only request payment for changes in the Work against an approved Change Order.
 - 6. If either Engineer or Owner's Representative disapproves the Change Proposal, the reason for disapproval will be stated.
 - a. A request for a revised proposal or cancellation of the proposal will be shown.

- C. Field Orders:
 - 1. Order minor changes in the Work without changes in Contract Price or Contract Times.

1.08 LUMP-SUM/FIXED PRICE CHANGE ORDER

- A. Content of Change Orders will be based on, either:
 - 1. Engineer's Proposal Request and Contractor's responsive Change Proposal as mutually agreed between Owner and Contractor.
 - 2. Contractor's Change Proposal for a change, as recommended by Engineer.
- B. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.
- C. Contractor will sign and date the Change Order to indicate agreement with the terms.

1.09 UNIT PRICE CHANGE ORDER

- A. Content of Change Orders will be based on, either:
 - 1. Engineer's definition of the scope of the required changes.
 - 2. Contractor's Change Proposal for a change, recommended by Engineer.
 - 3. Survey of completed work.
- B. The amounts of the unit prices to be:
 - 1. Those stated in the Contract.
 - 2. Those mutually agreed upon between Owner and Contractor.
- C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
 - 1. Owner and Engineer will sign and date the Change Order as authorization for Contractor to proceed with the changes.
 - 2. Contractor will sign and date the Change Order to indicate agreement with the terms.
- D. When quantities of the items cannot be determined prior to start of the work:
 - 1. Engineer or Owner will issue a Work Change Directive authorization directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
 - 2. At completion of the change, Engineer will determine the cost of such work based on the unit prices and quantities used.
 - 3. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.
- E. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.
- F. Contractor will sign and date the Change Order to indicate their agreement with the terms.

1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/WORK CHANGE DIRECTIVE AUTHORIZATION

- A. Engineer will issue a Work Change Directive for the Owner's signature authorizing Contractor to proceed with the changes.
- B. At completion of the change, Contractor shall submit itemized accounting and supporting data as specified in this Section.
- C. Engineer will determine the allowable cost of such work, as provided in the Contract Documents.
- D. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.
- E. Contractor will sign and date the Change Order to indicate their agreement.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Applications for Payment forms to record each Change Order as a separate item of Work, and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise subschedules to show changes for other items of work affected by the changes.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01292
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for preparation, format, and submittal of Schedule of Values.

1.02 PREPARATION

- A. Schedule of Values shall be a listing of all cost loaded, on-site construction activities from the progress schedule, listed in numerical order, showing that the sum total of all cost-loaded activities equal the Contract value.
- B. When the schedule is changed or revised to include added or deleted work, the Schedule of Values shall also be revised such that the sum total of all cost-loaded activities continuously equal the current Contract value.
 - 1. Equate the aggregate of these costs to the Lump Sum Contract Price.
- C. Prepare Schedule of Values identifying costs of Major Items of Work.

1.03 SUBMITTALS

- A. Submit Schedule of Values for the Preliminary Schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01294

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Procedures for preparation and submittal of Applications for Payment.

1.02 FORMAT

- A. Develop satisfactory spreadsheet-type form generated by downloading cost data from the Progress Schedule.
 - 1. Submit payment requests and attach spreadsheet with cost data related to Progress Schedule.
- B. Fill in information required on form.
- C. When Change Orders are executed, add Change Orders at end of listing of scheduled activities:
 - 1. Identify change order by number and description.
 - 2. Provide cost of change order in appropriate column.
- D. After completing, submit Application for Payment.
- E. Engineer will review application for accuracy. When accurate, Engineer will transmit application to Owner for processing of payment.
- F. Execute application with signature of responsible officer of Contractor.

1.03 SUBSTANTIATING DATA

- A. Provide Substantiating Data identifying:
 - 1. Project.
 - 2. Application number and date.
 - 3. Cost flow summary.
 - 4. Updated schedule of values.
 - 5. Progress schedule.
 - 6. Detailed list of enclosures.
 - 7. Stored products log.
 - 8. Equipment log.
 - 9. Submit "certified" payroll, if applicable.
 - 10. Record (as-built) documents.
 - 11. Photos and videos from current pay period.
 - 12. Applicable unconditional waiver and release on progress payment for previous payment made by Owner.

1.04 SUBMITTALS

- A. Submit Application for Payment and Substantiating Data with cover letter.

1.05 PAYMENT REQUESTS

- A. Prepare progress payment requests on a monthly basis. Base requests on the breakdowns of costs for each scheduled activity and the percentage of completion for each activity.
- B. Indicate total dollar amount of work planned for every month of the project. Equate sum of monthly amounts to Lump Sum Contract Price.
- C. Generate Progress Payment request forms by downloading cost data from the schedule information to a spreadsheet type format.
- D. Identify each activity on the Progress Schedule that has a cost associated with it, the cost for each activity, the estimated percent complete for each activity, and the value of work completed for both the payment period and job to date.
- E. Prepare summary of cost information for each Major Item of Work listed in the Schedule of Values. Identify the value of work completed for both the payment period and job to date.
- F. Payment period:
 - 1. Monthly Application for Payment period shall begin on the 1st day of each month, and end on the last day of each month.
 - 2. Submit Application for Payment to Engineer no later than the 5th day of each month for work completed the previous month.
 - 3. Engineer will finalize and submit recommendation for Application for Payment to Owner by the 15th day of each month to allow time for processing and approval.

1.06 COST SUMMARIES

- A. Prepare Summary of Cost Information for each Major Item of Work listed in the Schedule of Values. Identify the Value of Work Completed for both the payment period and job to date.
- B. Cash flow summary: Prepare cash flow summary, indicating total dollar amount of work planned for each month of the project. Equate sum of monthly amounts to Lump Sum contract price.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01312
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for conducting conferences and meetings for the purposes of addressing issues related to the Work, reviewing and coordinating progress of the Work and other matters of common interest, and includes the following:
 - a. Qualifications of Meeting Participants.
 - b. Basic Meeting Requirements.
 - c. Pre-construction Conference.
 - d. Progress Meetings.
 - e. Quality Control Meetings.
 - f. Pre-Installation Meetings.
 - g. Maintenance of Plant Operations (MOPO) Meetings.

1.02 QUALIFICATIONS OF MEETING PARTICIPANTS

- A. Representatives of entities participating in meetings shall be qualified and authorized to act on behalf of entity each represents.

1.03 BASIC MEETING REQUIREMENTS

- A. Attendees:
 - 1. Meeting leader shall require attendance of parties directly affecting, or affected by, Work being discussed at the meeting.
- B. Location:
 - 1. In location convenient for most invitees.
- C. Notification:
 - 1. Meeting leader shall notify attendees of meeting, including an agenda, a minimum of 7 days prior to meeting.
- D. Agenda:
 - 1. Meeting leader shall prepare copies of the agenda for participants and distribute at the meeting.
 - 2. Minimum requirements:
 - a. Meeting purpose.
 - b. Review minutes of previous meeting.
 - c. Safety and security.
 - d. Discuss issues.
 - e. Action items.
 - f. Next meeting.

- E. Meeting minutes:
 - 1. Meeting leader shall prepare draft minutes and send to attendees for comment within 7 days.
 - 2. Meeting leader shall incorporate comments from attendees and submit final meeting minutes to attendees within 7 days of receipt of comments.

1.04 PRE-CONSTRUCTION CONFERENCE

- A. Engineer leads the meeting.
- B. Timing:
 - 1. Upon issuance of Notice to Proceed, or earlier when mutually agreeable.
- C. Required attendees:
 - 1. Contractor's project manager and superintendent, Owner, Engineer, representatives of utilities, major subcontractors and others involved in performance of the Work, and others necessary to the agenda.
- D. Agenda minimum requirements:
 - 1. Meeting purpose:
 - a. To establish working understanding between parties and to discuss Construction Schedule, Shop Drawings and other Submittals, cost breakdown of major lump sum items, processing of Submittals and applications for payment, and other subjects pertinent to execution of the Work.
 - 2. Adequacy of distribution of Contract Documents.
 - 3. Distribution and discussion of list of major subcontractors and suppliers.
 - 4. Proposed progress schedules and critical construction sequencing.
 - 5. Major equipment deliveries and priorities.
 - 6. Project coordination.
 - 7. Designation of responsible personnel.
 - 8. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals - separate meeting.
 - d. Change Orders.
 - e. Request for Information/Interpretations.
 - f. Applications for Payment.
 - g. Record documents.
 - 9. Use of premises:
 - a. Office, construction, and storage areas.
 - b. Owner's requirements.
 - 10. Construction facilities, controls, and construction aids.
 - 11. Temporary utilities.
 - 12. Safety and first aid procedures.
 - 13. Security procedures.
 - 14. Housekeeping procedures.
 - 15. Safety and security.
 - 16. Schedule.
 - 17. Review proposed photographer Submittal.
 - 18. Action items.

19. Next meeting.

E. Location: CWSID Treatment Plant.

1.05 PROGRESS MEETINGS

A. Engineer will lead the meeting.

B. Timing:

1. Hold meetings throughout progress of the Work at maximum bi-weekly intervals.

C. Required attendees:

1. Owner, Engineer, Contractor, Contractor's project manager, superintendent, quality control manager, project scheduler, major subcontractors and suppliers as appropriate to the agenda topics for each meeting.
2. Additional invitees:
 - a. Owner utility companies when the Work affects their interests, and others necessary to the agenda.

D. Agenda minimum requirements:

1. Meeting purpose:
 - a. Provide the status of the Work.
2. Review minutes of previous meeting.
3. Safety and security.
4. Construction schedule summary.
5. Review of 6 weeks schedule.
 - a. Contractor shall provide printed hard copies for each attendee.
6. Review of off-site fabrication and delivery schedules.
7. Review of Submittals schedule and status of Submittals.
8. Request for information (RFI's) status.
9. MOP's/shutdown coordination.
10. Change order management status.
11. Maintenance of quality standards (QA/QC).
12. Field observations, problems, and conflicts.
13. Commissioning.
14. Partnering recognition status (optional).
15. General items.
16. Schedule
17. Action items.
18. Next meeting.

E. Location

1. Meetings to be held at CWSID Treatment Plant

1.06 PRE-INSTALLATION MEETINGS

A. Contractor leads the meeting.

- B. Timing:
 - 1. When specified in Technical Sections or requested by Engineer, before commencing Work of specific section.

- C. Required attendees:
 - 1. Owner, Engineer, Contractor, Contractor's project manager, general superintendent, project scheduler, major subcontractors including electrical instrumentation, and suppliers as appropriate to the agenda topics for each meeting.
 - 2. Additional invitees:
 - a. Owner utility companies when the Work affects their interests and others necessary to the agenda.

- D. Agenda minimum requirements:
 - 1. Meeting purpose:
 - a. Review conditions of installation, preparation, and installation procedures.
 - b. Review coordination with related work.
 - 2. Review minutes of previous meeting.
 - 3. Safety and security.
 - 4. Action items.
 - 5. Next meeting.

1.07 QUALITY CONTROL MEETINGS

- A. Contractor leads the meeting.

- B. Timing:
 - 1. Hold meetings throughout progress of the Work at maximum weekly intervals.

- C. Required attendees:
 - 1. Engineer, Construction manager and staff, Contractor's quality control manager, and staff.

- D. Agenda minimum requirements:
 - 1. Meeting purpose:
 - a. Update Contractor's efforts to comply with quality requirements in the Contract Documents.
 - 2. Review minutes of previous meeting.
 - 3. Review of Work progress and schedule.
 - 4. Review of out-of-compliance inspection or test results.
 - 5. Field observations, problems, and decisions.
 - 6. Review of offsite fabrication and delivery schedules.
 - 7. Planned progress during succeeding work period.
 - 8. Coordination of required inspections and tests.
 - 9. Review 6-week schedule report with upcoming inspections and special tests.
 - 10. Maintenance of quality and work standards.
 - 11. Other business relating to Work.
 - 12. Safety and security.
 - 13. Action items.
 - 14. Next meeting.

1.08 POST CONSTRUCTION MEETING (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements and procedures for Submittals to confirm compliance with Contract Documents.

1.02 GENERAL INSTRUCTIONS

- A. Contractor is responsible to determine and verify field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and check and coordinate each item with other applicable approved Shop Drawings and Contract Document requirements.
- B. Provide Submittals:
 - 1. That are specified or reasonably required for construction, operation, and maintenance of the Work.
 - 2. That demonstrate compliance with the Contract Documents.
- C. Where multiple Submittals are required, provide a separate Submittal for each Specification section.
 - 1. In order to expedite construction, the Contractor may make more than one Submittal per Specification section, but a single Submittal may not cover more than one Specification section:
 - a. The only exception to this requirement is when one Specification section covers the requirements for a component of equipment specified in another section.
 - b. For example, circuit breakers are a component of switchgear. The switchgear Submittal must also contain data for the associated circuit breakers, even though they are covered in a different Specification section.
- D. Prepare Submittals in the English language. Do not include information in other languages.
- E. Present measurements in customary American units (feet, inches, pounds, etc.).
- F. Must be clear and legible, and of sufficient size for presentation of information.
- G. Page size, other than drawings:
 - 1. Minimum: 8-1/2 inches by 11 inches.
 - 2. Maximum: 11 inches by 17 inches.

- H. Drawing sheet size:
 - 1. Maximum: 22 inches by 34 inches.
 - a. Minimum plan scale: 1/8 inch equals 1 foot-0 inches.
 - b. Minimum font size: 1/8-inch.
 - 2. 11-inch by 17-inch sheet:
 - a. Minimum plan scale: 1/8 inch equals 1 foot-0 inches.
 - b. Minimum font size: 1/8-inch.
- I. Show dimensions, construction details, wiring diagrams, controls, manufacturers, catalog numbers, and all other pertinent details.
- J. Provide Submittal information from only one manufacturer for a specified product. Submittals with multiple manufacturers for one product will be rejected without review.

1.03 SUBMITTAL ORGANIZATION

- A. Organize Submittals in exactly the same order as the items are referenced, listed, and/or organized in the Specification section.
- B. For Submittals that cover multiple devices used in different areas under the same Specification section, the Submittal for the individual devices must list the area where the device is used.
- C. Bookmarks:
 - 1. Bookmarks shall match the table of contents.
 - 2. Bookmark each section (tab) and heading.
 - 3. Drawings: Bookmark at a minimum, each discipline, area designation, or appropriate division.
 - 4. At file opening, display all levels of bookmarks as expanded.
- D. Where applicable (i.e., except for Drawings, figures, etc.), Submittal content shall be electronically searchable utilizing the PDF file as submitted.
- E. Thumbnails optimized for fast web viewing.
- F. Sequentially number pages within the tabbed sections:
 - 1. Submittals that are not fully indexed and tabbed with sequentially numbered pages, or are otherwise unacceptable, will be returned without review.
- G. Attachments:
 - 1. Include with each Submittal a copy of the relevant Specification section.
 - a. Indicate in the left margin, next to each pertinent paragraph, either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).
 - b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
 - 2. Include with each Submittal a copy of the relevant Drawing, including relevant addendum updates.
 - a. Indicate either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).

- b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
 - c. Provide field dimensions and relationship to adjacent or critical features of the Work or materials.

- H. Contractor: Prepare Submittal information in sufficient detail to show compliance with specified requirements.
 - 1. Determine and verify quantities, field dimensions, product dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.
 - 2. Coordinate Submittal with other Submittals and with the requirements of the Contract Documents.
 - 3. Check, verify, and revise Submittals as necessary to bring them into conformance with Contract Documents and actual field conditions.

- I. Contractor: Prepare "Or Equal" Submittal information.
 - 1. Provide standard Submittal requirements.
 - a. In addition, provide in sufficient detail to show reason for variance from specified product and impacts.
 - 2. Provide reason the specified product is not being provided.
 - 3. Explain the benefits to the Owner for accepting the "Or Equal".
 - 4. Itemized comparison of the proposed "Or Equal" with product specified, including a list of significant variations:
 - a. Design features.
 - b. Design dimensions.
 - c. Installation requirements.
 - d. Operations and maintenance requirements.
 - e. Availability of maintenance services and sources of replacement materials.
 - 5. Reference projects where the product has been successfully used:
 - a. Name and address of project.
 - b. Year of installation.
 - c. Year placed in operation.
 - d. Name of product installed.
 - e. Point of contact: Name and phone number.
 - 6. Define impacts:
 - a. Impacts to other contracts.
 - b. Impacts to other work or products.
 - 7. Contractor represents the following:
 - a. Contractor bears the burden of proof of the equivalency of the proposed "Or Equal".
 - b. Proposed "Or Equal" is equal or superior to the specified product.
 - c. Contractor will provide the warranties or bonds that would be provided on the specified product on the proposed "Or Equal", unless the Owner requires a Special Warranty.
 - d. Contractor will coordinate installation of accepted "Or Equal" into the Work and will be responsible for the costs to make changes as required to the Work.
 - e. Contractor waives rights to claim additional costs caused by proposed "Or Equal" which may subsequently become apparent.

- J. Contractor: Prepare substitution Submittal information.
1. Provide standard Submittal requirements.
 - a. In addition, provide in sufficient detail to show reason for variance from specified product and impacts.
 2. Provide reason the specified product is not being provided.
 3. Explain the benefits to the Owner for accepting the substitution.
 4. Itemized comparison of the proposed substitution with product specified, including a list of significant variations:
 - a. Design features.
 - b. Design dimensions.
 - c. Installation requirements.
 - d. Operations and maintenance requirements.
 - e. Availability of maintenance services and sources of replacement materials.
 5. Reference projects where the product has been successfully used:
 - a. Name and address of project.
 - b. Year of installation.
 - c. Year placed in operation.
 - d. Name of product installed.
 - e. Point of contact: Name and phone number.
 6. Define impacts:
 - a. Impacts to Contract Price.
 - 1) Required license fees or royalties.
 - 2) Do not include costs under separate contracts.
 - 3) Do not include Engineer's costs for redesign or revision of Contract Documents.
 - b. Impacts to Contract Time.
 - c. Impacts to Contract Scope.
 - d. Impacts to other contracts.
 - e. Impacts to other work or products.
 7. Contractor represents the following:
 - a. Contractor shall pay associated costs for the Engineer to evaluate the substitution.
 - b. Contractor bears the burden of proof of the equivalency of the proposed substitution.
 - c. Proposed substitution does not change the design intent and will have equal performance to the specified product.
 - d. Proposed substitution is equal or superior to the specified product.
 - e. Contractor will provide the warranties or bonds that would be provided on the specified product on the proposed substitution, unless the Owner requires a Special Warranty.
 - f. Contractor will coordinate installation of accepted substitution into the Work and will be responsible for the costs to make changes as required to the Work.
 - g. Contractor waives rights to claim additional costs caused by proposed substitution which may subsequently become apparent.

1.04 SUBMITTAL IDENTIFICATION NUMBERING

A. Number each Submittal using the format defined in the table below:

	Spec Section Number	Dash	Initial Submittal - Sequential Number	Decimal Point	Subsequent Submittal Revisions Sequential Number
<i>Example 1 Description</i>	<i>Cast-In-Place Concrete</i>		<i>8th initial Submittal</i>		
	03300	-	0008		
<i>Example 2 Description</i>	<i>Cast-In-Place Concrete</i>		<i>8th initial Submittal</i>		<i>First revision to the 8th initial Submittal</i>
	03300	-	0008	.	1

1.05 SUBMITTALS IN ELECTRONIC MEDIA FORMAT

- A. General: Provide all information in PC-compatible format using Windows® operating system as utilized by the Owner and Engineer.
- B. Text: Provide text documents and manufacturer's literature in Portable Document Format (PDF).
- C. Graphics: Provide graphic Submittals (Drawings, diagrams, figures, etc.) utilizing Portable Document Format (PDF).

1.06 SUBMITTAL PROCEDURE

- A. Engineer: Review Submittal and provide response:
 - 1. Review description:
 - a. Engineer will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular Submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.
 - b. Engineer's review of Submittals shall not release the Contractor from the Contractor's responsibility for performance of requirements of Contract Documents. Neither shall the Engineer's review release the Contractor from fulfilling purpose of installation nor from the Contractor's liability to replace defective Work.
 - c. Engineer's review of Shop Drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.
 - d. Engineer's review does not extend to:
 - 1) Accuracy of dimensions, quantities, or performance of equipment and systems designed by the Contractor.
 - 2) Contractor's means, methods, techniques, sequences, or procedures, except when specified, indicated on the Drawings, or required by Contract Documents.

- 3) Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.
 - e. Engineer can Approve or Not Approve any exception at their sole discretion.
2. Review timeframe:
 - a. Except as may be provided in technical Specifications, a Submittal will be returned within 30 days.
 - b. When a Submittal cannot be returned within the specified period, Engineer will, within a reasonable time after receipt of the Submittal, give notice of the date by which that Submittal will be returned.
 - c. Engineer's acceptance of progress schedule containing Submittal review times less than those specified or agreed to in writing by the Engineer will not constitute Engineer's acceptance of review times.
 - d. Critical Submittals:
 - 1) Contractor will notify Engineer in writing that timely review of a Submittal is critical to the progress of Work.
3. Schedule delays:
 - a. No adjustment of Contract Times or Contract Price will be allowed due to Engineer's review of Submittals unless all of the following criteria are met:
 - 1) Engineer has failed to review and return first submission within the agreed upon time frame.
 - 2) Contractor demonstrates that delay in progress of Work is directly attributable to the Engineer's failure to return Submittal within time indicated and accepted by the Engineer.
4. Review response will be returned to the Contractor with one of the following dispositions:
 - a. Approved:
 - 1) No Exceptions:
 - a) There are no notations or comments on the Submittal and the Contractor may release the equipment for production.
 - 2) Make Corrections Noted - See Comments:
 - a) Contractor may proceed with the Work, however, all notations and comments must be incorporated into the final product.
 - b) Resubmittal not required.
 - 3) Make Corrections Noted - Confirm:
 - a) Contractor may proceed with the Work, however, all notations and comments must be incorporated into the final product.
 - b) Submit confirmation specifically addressing each notation or comment to the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.
 - b. Not Approved:
 - 1) Correct and Resubmit:
 - a) Contractor may not proceed with the Work described in the Submittal.
 - b) Contractor assumes responsibility for proceeding without approval.
 - c) Resubmittal of complete Submittal package is required within 30 calendar days of the date of the Engineer's Submittal review response.

- 2) Rejected - See Remarks:
 - a) Contractor may not proceed with the Work described in the Submittal.
 - b) Submittal does not meet the intent of the Contract Documents. Resubmittal of complete Submittal package is required with materials, equipment, methods, etc., that meet the requirements of the Contract Documents.
 - c. Receipt Acknowledged:
 - 1) Filed for Record:
 - a) This is used in acknowledging receipt of informational Submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc.
 - 2) With Comments - Resubmit:
 - a) This is used in acknowledging receipt of informational Submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc. Feedback regarding missing information, conflicting information, or other information that makes it incomplete can be made with comments.
- B. Contractor: Prepare resubmittal, if applicable:
- 1. Clearly identify each correction or change made. Provide page references to the changed information within the resubmittal.
 - 2. Include a response in writing to each of the Engineer's comments or questions for Submittal packages that are resubmitted in the order that the comments or questions were presented from the first and subsequent Submittals and numbered consistent with the Engineer's numbering.
 - a. Acceptable responses to the Engineer's comments are listed below:
 - 1) "Incorporated" - Engineer's comment or change is accepted and appropriate changes are made.
 - 2) "Response" - Engineer's comment not incorporated. Explain why comment is not accepted or requested change is not made. Explain how requirement will be satisfied in lieu of comment or change requested by the Engineer.
 - b. Reviews and resubmittals:
 - 1) Contractor shall provide resubmittals which include responses to all Submittal review comments separately and at a level of detail commensurate with each comment.
 - 2) Contractor responses shall indicate how the Contractor resolved the issue pertaining to each review comment
 - a) Responses such as "acknowledged" or "noted" are not acceptable.
 - 3) Resubmittals which do not comply with this requirement may be rejected and returned without review.
 - 4) Contractor shall be allowed no extensions of any kind to any part of their contract due to the rejection of non-compliant Submittals.
 - 5) Submittal review comments not addressed by the Contractor in resubmittals shall continue to apply whether restated or not in subsequent reviews until adequately addressed by the Contractor to the satisfaction of the reviewing and approving authority.

- c. Any resubmittal that does not contain responses to the Engineer's previous comments shall be returned for revision and resubmittal. No further review by the Engineer will be performed until a response for previous comments has been received.
- 3. Resubmittal timeframe:
 - a. Contractor shall provide resubmittal within 15 days.
 - b. When a resubmittal cannot be returned within the specified period, Contractor shall notify the Engineer in writing.
- 4. Review costs:
 - a. Costs incurred by the Owner as a result of additional reviews of a particular Submittal after the second time it has been reviewed shall be borne by the Contractor.
 - b. Reimbursement to the Owner will be made by deducting such costs from the Contractor's subsequent progress payments.

1.07 PRODUCT DATA

- A. Edit Submittals so that the Submittal specifically applies to only the product furnished.
- B. Neatly cross out all extraneous text, options, models, etc., that do not apply to the product being furnished so that the information remaining is only applicable to the product being furnished.

1.08 SHOP DRAWINGS

- A. Contractor to field verify elevation, coordinates, and pipe material for pipe tie-in to pipeline or structure prior to the preparation of Shop Drawings.
- B. Indicate project-designated equipment tag numbers for Submittal of devices, equipment, and assemblies.

1.09 SAMPLES

- A. Details:
 - 1. Submit labeled samples.
 - 2. Samples will not be returned.
 - 3. Provide number of sample Submittals as below:
 - a. Total: 2 minimum.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

ATTACHMENT A - CONTRACTOR SUBMITTAL TRANSMITTAL FORM

CONTRACTOR SUBMITTAL TRANSMITTAL FORM

Owner:	Click here to enter text.	Date:	MM/DD/YYYY
Contractor:	Click here to enter text.	Project No.:	XXXXXX.XX
Project Name:	Click here to enter text.	Submittal Number:	000
Submittal Title:	Click here to enter text.		
To:	Click here to enter text.		
From:	Click here to enter text.	Click here to enter text.	
	Click here to enter text.	Click here to enter text.	

Specification No. and Subject of Submittal/Equipment Supplier			
Spec ##:	Spec ##.	Subject:	Click here to enter text.
Authored By:	Click here to enter text.	Date Submitted:	XX/XX/XXXX

Submittal Certification
Check Either (A) or (B):
<input type="checkbox"/> (A) We have verified that the equipment or material contained in this Submittal meets all the requirements specified in the project manual or shown on the Contract Drawings with no exceptions.
<input type="checkbox"/> (B) We have verified that the equipment or material contained in this Submittal meets all the requirements specified in the project manual or shown on the Contract Drawings, except for the deviations listed.
Certification Statement: By this Submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved Shop Drawings and all Contract requirements.
General Contractor's Reviewer's Signature:
Printed Name:

PM/CM Office Use
Date Received GC to PM/CM: _____
Date Received PM/CM to Reviewer: _____
Date Received Reviewer to PM/CM: _____
Date Sent PM/CM to GC: _____

SECTION 01410
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Regulatory authorities and codes.

1.02 AUTHORITIES HAVING JURISDICTION (AHJ)

- A. Also referred to as the permitting agency.
- B. Building Department: Marriot-Slaterville City.
- C. Fire Department: Weber County Fire Department.
- D. Potable Water Utility: Marriot-Slaterville City.
- E. Wastewater Utility: Central Weber Sewer Improvement District.
- F. Electrical Utility: Rocky Mountain Power.
- G. SWPPP: Weber County

1.03 APPLICABLE CODES

- A. International Code Council (ICC).
 - 1. Building code:
 - a. International Building Code (IBC), 2021.
 - b. International Existing Building Code (IEBC), 2021.
 - 2. Electrical code:
 - a. National Fire Protection Association (NFPA), NFPA 70: National Electrical Code (NEC), 2020.
 - 3. Energy code:
 - a. International Energy Conservation Code (IECC), 2021.
 - 4. Fire code:
 - a. International Fire Code (IFC), 2020.
 - 5. Fuel gas code:
 - a. International Fuel Gas Code (IFGC), 2021.
 - 1) [Local amendments.]
 - 6. Mechanical code:
 - a. International Mechanical Code (IMC), 2021.
 - 7. Plumbing code:
 - a. International Plumbing Code (IPC), 2021.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Quality control and control of installation.
 - 2. Tolerances.
 - 3. References.
 - 4. Mock-up requirements.
 - 5. Authority and duties of the Owner's representative or inspector.
 - 6. Sampling and testing.
 - 7. Testing and inspection services.
 - 8. Contractor's responsibilities.

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with the Contract Documents, request clarification from the Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work, except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- H. When specified, products will be tested and inspected either at point of origin or at Work site:
 - 1. Notify the Engineer in writing well in advance of when products will be ready for testing and inspection at point of origin.
 - 2. Do not construe that satisfactory tests and inspections at point of origin is final acceptance of products. Satisfactory tests or inspections at point of origin do not preclude retesting or re-inspection at the Work site.
- I. Do not ship products which require testing and inspection at point of origin prior to testing and inspection.

1.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with the Contract Documents, request clarification from the Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.04 REFERENCES

- A. ASTM International (ASTM):
 - 1. E329 - Standard for Agencies Engaged in Construction Inspection, Testing or Special Inspection.
- B. National Institute of Standards and Technology (NIST).

1.05 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by the Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by the Engineer.

1.06 AUTHORITY AND DUTIES OF OWNER'S REPRESENTATIVE OR INSPECTOR

- A. Owner's Project Representative employed or retained by the Owner is authorized to inspect the Work.
- B. Inspections may extend to entire or part of the Work and to preparation, fabrication, and manufacture of products for the Work.
- C. Deficiencies or defects in the Work which have been observed will be called to the Contractor's attention.
- D. Inspector will not:
 - 1. Alter or waive provisions of the Contract Documents.
 - 2. Inspect the Contractor's means, methods, techniques, sequences, or procedures for construction.
 - 3. Accept portions of the Work, issue instructions contrary to intent of the Contract Documents, or act as foreman for the Contractor. Supervise, control, or direct the Contractor's safety precautions or programs; or inspect for safety

conditions on Work site, or of persons thereon, whether the Contractor's employees or others.

- E. Inspector will:
 - 1. Conduct on-site observations of the Work in progress to assist the Engineer in determining when the Work is, in general, proceeding in accordance with the Contract Documents.
 - 2. Report to the Engineer whenever the inspector believes that Work is faulty, defective, does not conform to the Contract Documents, or has been damaged; or whenever there is defective material or equipment; or whenever the inspector believes the Work should be uncovered for observation or requires special procedures.

1.07 SAMPLING AND TESTING

- A. General:
 - 1. Prior to delivery and incorporation in the Work, submit listing of sources of materials, when specified in sections where materials are specified.
 - 2. When specified in sections where products are specified:
 - a. Submit sufficient quantities of representative samples of character and quality required of materials to be used in the Work for testing or examination.
 - b. Test materials in accordance with standards of national technical organizations.
- B. Sampling:
 - 1. Furnish specimens of materials when requested.
 - 2. Do not use materials which are required to be tested until testing indicates satisfactory compliance with specified requirements.
 - 3. Specimens of materials will be taken for testing whenever necessary to determine quality of material.
 - 4. Assist the Engineer in preparation of test specimens at site of work, such as soil samples and concrete test cylinders.

1.08 TESTING AND INSPECTION SERVICES

- A. Contractor will employ and pay for specified services of an independent firm to perform the Contractor quality control testing as required in the technical specifications for various work and materials.
- B. Owner will employ and pay for specified services of an "Owner's independent testing firm" certified to perform testing and inspection as required in the technical specifications for various work and materials or stipulated in Section 01455 - Regulatory Quality Assurance to confirm the Contractor's compliance with the Contract Documents.
- C. Owner's independent testing firm will perform tests, inspections, and other services specified in individual specification sections and as required by the Owner and requested by the Engineer.

- D. The qualifications of laboratory that will perform the testing, contracted by the Owner or by the Contractor, shall be as follows:
1. Has authorization to operate in the state where the Project is located.
 2. Meets "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
 3. Meets requirements of ASTM E329.
 4. Laboratory Staff: Maintain full time specialist on staff to review services.
 5. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to NIST or accepted values of natural physical constants.
 6. Will submit copy of report of inspection of facilities made by Materials Reference Laboratory of NIST during most recent tour of inspection, with memorandum of remedies of deficiencies reported by inspection.
- E. Testing, inspections, and source quality control may occur on or off the Project Site. Perform off-site testing inspections and source quality control as required by the Engineer or Owner.
- F. Contractor shall cooperate with the Owner's independent testing firm, furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
1. Notify the Engineer and Owner's independent testing firm 48 hours prior to expected time for operations requiring testing.
 2. Make arrangements with the Owner's independent testing firm and pay for additional samples and tests required for the Contractor's use.
- G. Limitations of authority of testing laboratory: Owner's independent testing firm or laboratory is not authorized to:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of the Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of the Contractor.
 4. Agency or laboratory has no authority to stop the Work.
- H. Testing and employment of an Owner's independent testing firm or laboratory shall not relieve the Contractor of obligation to perform Work in accordance with requirements of the Contract Documents.
- I. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by the same Owner's independent testing firm on instructions by the Engineer. Payment for re-testing or re-inspection will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- J. Owner's independent testing firm responsibilities will include:
1. Test samples of mixes submitted by the Contractor.
 2. Provide qualified personnel at Site. Cooperate with the Engineer and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of the Contract Documents.

5. Promptly notify the Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 6. Perform additional tests required by the Engineer.
 7. Attend preconstruction meetings and progress meetings when requested.
- K. Owner's independent testing firm individual test reports:
1. After each test, the Owner's independent testing firm will promptly submit electronically report to the Engineer and Contractor.
 2. Test reports shall include at least the following information:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in Project.
 - g. Type of inspection or test.
 - h. Date of test.
 - i. Certified test results stamped and signed by a registered Engineer in the state where the Project is located.
 - j. Summary of conformance with the Contract Documents.
 - k. When requested by the Engineer, the Owner's independent testing firm will provide interpretation of test results.

1.09 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with the Owner's independent testing firm or laboratory personnel and provide access to construction and manufacturing operations.
- B. Secure and deliver to the Owner's independent testing firm or laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
- C. Provide to the Owner's independent testing firm or laboratory and the Engineer preliminary mix design proposed to be used for concrete, and other materials mixes which require control by testing laboratory.
- D. Submit product test reports electronically.
- E. Furnish incidental labor and facilities:
 1. To provide access to construction to be tested.
 2. To obtain and handle samples at Work site or at source of product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify the Owner's independent testing firm or laboratory 48 hours in advance of when observations, inspections and testing is needed for laboratory to schedule and perform in accordance with their notice of response time.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01455

REGULATORY QUALITY ASSURANCE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Project regulatory requirements for quality assurance that includes Special Inspections, Special Certification, and Structural Observation.
- B. Special Certification and Special Inspections in this Section are in addition to the requirements specified in Section 01450 - Quality Control, and in the individual Sections.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 318 - Building Code Requirements for Structural Concrete.
 - 2. 530 - Building Code Requirements for Masonry Structures.
 - 3. 530.1 - Specification for Masonry Structures.
- B. American Institute of Steel Construction (AISC):
 - 1. 360 - Specification for Structural Steel Buildings.
- C. American Society of Civil Engineers (ASCE):
 - 1. 7 - Minimum Design Loads for Buildings and Other Structures.
- D. American Welding Society (AWS):
 - 1. D1.3 - Structural Welding Code - Sheet Steel.
 - 2. D1.4 - Structural Welding Code - Reinforcing Steel.
- E. ASTM International (ASTM):
 - 1. A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
 - 2. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 4. C1611 - Standard Test Method for Slump Flow of Self-Consolidating Concrete.
- F. Building Code:
 - 1. As specified in Section 01410 - Regulatory Requirements.
- G. The Masonry Society (TMS):
 - 1. 402 - Building Code for Masonry Structures.
 - 2. 602 - Specifications for Masonry Structures.

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
 - 1. Special Certification: Certification for designated seismic systems that demonstrates compliance with performance requirements.
 - 2. Special Inspection: Inspection of the materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.
 - 3. Special Inspection, Continuous: The full-time observation of work requiring Special Inspection by an approved special inspector who is present in the area where the work is being performed.
 - 4. Special Inspection, Periodic: The part-time, or intermittent observation of work requiring Special Inspection by an approved special inspector who is present in the area where the work is being performed and at the completion of the work.
 - 5. Structural Observation: The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents at significant construction stages and at completion of the structural system.

1.04 SUBMITTALS

- A. Submit Special Certifications for designated seismic systems.
- B. Schedule and coordinate the submittal of Special Inspection reports and test results prepared by others.

1.05 SPECIAL INSPECTION

- A. Owner will employ 1 or more special inspectors who will provide Special Inspections during construction.
- B. Special inspector(s) shall be qualified for inspection of the particular type of materials or operations requiring Special Inspection.
- C. Testing laboratory: Testing that is required to satisfy the requirements of Special Inspection will be performed by the Owner's testing laboratory as specified in Section 01450 - Quality Control.
- D. Duties of special inspector:
 - 1. General: Required duties of the special inspector(s) shall be as described in the Building Code.
 - 2. Reporting: Special inspector(s) shall provide reports of each inspection to the Owner and shall distribute copies of inspection reports to the Engineer and Contractor as required.
 - a. Reports shall, at a minimum, include the following items:
 - 1) Date and time of inspection, and name(s) of individual(s) performing the inspection.
 - 2) Structures and areas of the structure where work or testing was observed.

- 3) Discrepancies between the requirements of the Contract Documents and the work or testing observed.
 - 4) Other areas of deficiency in the Work.
- E. Special Inspections shall not be construed as fulfilling the requirements for Structural Observation.
- F. Owner or special inspector are responsible to select materials for Special Inspection.
1. Contractor shall not select materials for Special Inspection.

1.06 SPECIAL CERTIFICATION

- A. Provide equipment that meets the special certification requirements of the Building Code.
- B. Designated seismic systems shall be subject to the testing and qualification requirements of the regulatory Building Code, and shall require Special Certification as set forth in ASCE 7:
1. Mechanical equipment that is assigned an importance factor of 1.50 as specified in Section 01850 - Design Criteria.
 2. All electrical equipment.
- C. Special certification requirements for designated seismic systems:
1. Submittals shall include certification that the equipment is seismically qualified. Certifications are subject to review and acceptance by Owner.
 2. Certifications may be at least one of the following in accordance with ASCE 7:
 - a. Analysis.
 - b. Testing.
 - c. Experience data.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SPECIAL INSPECTIONS

- A. Owner will provide Special Inspection of the following types of work as described in the Building Code wherever such work occurs, unless otherwise specified.
1. Attachment D - Soils - Special Inspection Schedule.

3.02 SPECIAL CERTIFICATION

- A. Special inspector shall examine the designated seismic system(s) and determine whether the designated system components, including anchorage, are consistent with the evidence of compliance submitted for Special Certification.

3.03 STRUCTURAL OBSERVATION (NOT USED)

3.04 SCHEDULE

- A. Allow time necessary for Special Inspections and Structural Observation specified in this Section.
- B. Sufficient notice shall be given so that the Special Inspections and Structural Observations can be performed. Allow time for individuals performing to travel to the site.

3.05 PROCEDURE

- A. Special inspector will immediately notify the Engineer of any corrections required and follow notification with appropriate documentation.
- B. Contractor shall not proceed until the work is satisfactory to the Engineer.

END OF SECTION

ATTACHMENT D- SOILS - SPECIAL INSPECTION SCHEDULE

SOILS - SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection ⁽¹⁾ (During Task Listed)	
		Continuous	Periodic
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Building Code		●
2. Verify excavations are extended to proper depth and have reached proper material.	Building Code		●
3. Perform classification and testing of fill and backfill materials.	Building Code		●
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of fill and backfill.	Building Code	●	
5. Prior to placement of fill, observe subgrade and verify that site has been prepared properly.	Building Code		●
<u>Notes:</u> (1) "●" represents a required inspection activity for the project where it occurs.			

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, and removal after construction.

1.02 REFERENCE

- A. American National Standards Institute (ANSI).
- B. Occupational Safety and Health Administration (OSHA).

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.

1.04 TEMPORARY UTILITIES

- A. Temporary electrical power:
 - 1. Contractor provides the power.
 - a. The Contractor is responsible for providing generators, breakers, switches, transformers, and cables required for temporary power for construction.
 - 2. Provide and maintain adequate jobsite power distribution facilities conforming to applicable Laws and Regulations.
- B. Temporary electrical lighting:
 - 1. In work areas, provide temporary lighting sufficient to maintain lighting levels during working hours not less than lighting levels required by OSHA and state agency which administers OSHA regulations where Project is located.
 - 2. When available, permanent lighting facilities may be used in lieu of temporary facilities:
 - a. Prior to final completion of the Work, replace bulbs, lamps, or tubes used by Contractor for lighting.
- C. Temporary heating, cooling, and ventilating:
 - 1. Heat and ventilate work areas to protect the Work from damage by freezing, high temperatures, weather, and to provide safe environment for workers.
 - 2. Permanent heating system may be utilized when sufficiently completed to allow safe operation.

- D. Temporary water:
 - 1. Pay for and construct facilities necessary to furnish potable water for human consumption
 - 2. Remove temporary piping and connections and restore affected portions of the facility to original condition before final acceptance
 - 3. Pay for water used for construction prior to final acceptance.
 - 4. Development of potable water supply:
 - a. Potable water is not available at construction site.
 - b. Provide potable water for human consumption during construction period.
 - c. Furnish potable water that meets requirements of Laws and Regulations.
 - 5. Non-potable water is not available on the site.
 - a. Non-potable water supply is available at Central Weber Sewers Wastewater Treatment Plant at utility water hydrants for non-potable water uses.
- E. Temporary sanitary facilities:
 - 1. Provide suitable and adequate sanitary facilities that are in compliance with applicable Laws and Regulations.
 - 2. Existing facility use is not allowed.
 - 3. At completion of the Work, remove sanitary facilities and leave site in neat and sanitary condition.
- F. Temporary fire protection:
 - 1. Provide fire protection required to protect the Work and ancillary facilities.
- G. First aid: Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.
- H. Utilities in existing facilities: As specified in Section 01140 - Work Restrictions.
- I. Temporary dewatering pumping systems:
 - 1. Submit sketches showing layout of temporary pumping system, including pump quantity, configuration in wet well, and proposed piping layout specified in this Section.
 - 2. Submit piping headloss calculations based on proposed temporary piping system layout.
 - 3. Submit information at least 28 days prior to when the temporary pumping system is scheduled to be installed and allow 14 days for review and comment.

1.05 CONSTRUCTION AIDS

- A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.
- B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.

- C. Design temporary supports with adequate safety factor to ensure adequate load bearing capability:
 - 1. When requested, submit design calculations by professional registered engineer prior to application of loads.
 - 2. Submitted design calculations are for information and record purposes only.

- D. Accident prevention:
 - 1. Exercise precautions throughout construction for protection of persons and property.
 - 2. Observe safety provisions of applicable Laws and Regulations.
 - 3. Guard machinery and equipment and eliminate other hazards.
 - 4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.
 - 5. Before commencing construction work, take necessary action to comply with provisions for safety and accident prevention.

- E. Barricades:
 - 1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.
 - 2. Provide barriers with flashing lights after dark.
 - 3. Keep barriers in place until excavations are entirely backfilled and compacted.
 - 4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

- F. Warning devices and barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers:
 - 1. Provide devices in accordance with minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

- G. Hazards in public right-of-way:
 - 1. Comply with local jurisdiction standards and requirements for right-of-way barricades and other safety devices.
 - 2. Mark at reasonable intervals, trenches, and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours:
 - a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
 - 3. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades:
 - a. During hours of darkness, provide warning lights at close intervals.

- H. Hazards in protected areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

- I. Above grade protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

- J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage, or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.
- K. Fences:
 - 1. When entire or part of site is to be permanently fenced, permanent fence may be built to serve for both permanent and temporary protection of the work site, provided that damaged or defaced fencing is replaced prior to final completion.
 - 2. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons.
 - a. Bear responsibility for protection of plant and material on site of the Work when openings in existing fences are not closed.
 - 3. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
 - 4. Fence temporary openings when openings are no longer necessary.

1.06 SECURITY

- A. Make adequate provision for protection of the work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

1.07 ACCESS ROADS

- A. General:
 - 1. Temporary access to private property to be provided for by private landowner. Contractor is responsible for coordinating with private landowner for temporary access location, right-of way and easements.
 - 2. Build and maintain dust free roads which are suitable for travel at 20 miles per hour.
- B. Off-site access roads:
 - 1. Obtain rights-of-way or easements when electing to build along other alignment.
- C. On-site access roads:
 - 1. Maintain access roads to storage areas and other areas to which frequent access is required.
 - 2. Maintain similar roads to existing facilities on site of the Work to provide access for maintenance and operation.
 - 3. Protect buried vulnerable utilities under temporary roads with steel plates, wood planking, or bridges.
 - 4. Maintain on-site access roads free of mud.
 - 5. Provide controls to prevent vehicles leaving the site from tracking mud off the site onto the public right-of-way.

1.08 TEMPORARY CONTROLS

- A. Dust control:
 - 1. Prevent dust nuisance caused by operations, unpaved roads, excavation, backfilling, demolition, or other activities.
 - 2. Control dust by sprinkling with water, use of dust palliatives, modification of operations, or other means acceptable to agencies having jurisdiction.
- B. Noise control:
 - 1. Comply with noise and work hours regulations by local jurisdiction.
 - 2. In or near inhabited areas, particularly residential, perform operations in manner to minimize noise.
 - 3. In residential areas, take special measures to suppress noise during night hours.
- C. Mud control:
 - 1. Prevent mud nuisance caused by construction operations, unpaved roads, excavation, backfilling, demolition, or other activities.

1.09 PROJECT SIGN

- A. Provide and maintain Project identification sign consisting of painted 8-foot wide by 4-foot high exterior grade plywood and minimum 10-foot long, 4 by 4 lumber posts, set in ground at least 3 feet, with exhibit lettering by professional sign painter using no more than 5 sign colors:
 - 1. List at least the title of the Project, and names of the Owner, Engineer, and Contractor.
 - 2. Identify Contractor's, Engineer's names in upper right-hand corner underneath the bid number.
- B. On third and fourth lines of printing, paint appropriate dollar amounts.
- C. Erect Project identification sign where directed by Engineer within 14 days after the issuance of the Notice to Proceed.
- D. Replace or repair the project sign if it is damaged or covered with graffiti within 2 working days of observation or notification of damage or graffiti.

1.10 CONTRACTOR FIELD OFFICES AND SHEDS

- A. No contractor fields offices are required. Meetings and other activities requiring offices will use facilities at the Owners Wastewater Treatment Facility.

1.11 REMOVAL

- A. Remove temporary facilities and controls before inspection for final Completion or when directed.
- B. Clean and repair damage caused by installation or use of temporary facilities.

- C. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.
- D. Restore existing facilities used during construction to specified or original condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01573

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Installation of erosion and sediment control filter fabric fences.
 - 2. Straw bale fences and brush berms used during construction and prior to final development of site.
- B. Purpose of control fences is to contain pollutants from overland flow.
 - 1. Control fences are not for use in channelized flow areas.

1.02 UNIT PRICES

- A. Measure and pay for filter fabric fence by linear foot of completed and accepted filter fabric fence installed around construction site. Limits of construction site are indicated on the Drawings.
- B. Measure and pay for straw bale barrier by linear feet of completed and accepted straw bale barrier.

1.03 SUBMITTALS

- A. Manufacturer's catalog sheets and other product data on geotextile fabric.

1.04 REFERENCES

- A. ASTM International (ASTM):
 - 1. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - 2. D4355 - Standard Test Method for Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus.
 - 3. D4491- Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - 4. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - 5. D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes, and Related Products.
 - 6. D5665- Standard Specification for Thermoplastic Fabrics Used in Cold-Applied Roofing and Waterproofing.
 - 7. D6459 - Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Hillslopes from Rainfall-Induced Erosion.
 - 8. D6475 - Standard Test Method for Measuring Mass per Unit Area of Erosion Control Blankets.

9. D6525 - Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products.
10. D6567 - Standard Test Method for Measuring the Light Penetration of a Rolled Erosion Control Product (RECP).
11. D6818 - Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products.

1.05 QUALITY ASSURANCE FOR EROSION CONTROL BLANKETS

- A. Product shall be manufactured in accordance with a documented Quality Control Program. At a minimum, the following procedures and documentation shall be provided:
 1. Manufacturing Quality Control Program Manual.
 2. First piece inspection of products produced to assure component materials and finished product tolerances are within manufacturer specifications.
 3. Additional inspections for product conformance shall be conducted during the run after the first piece inspection.
 4. Every roll shall be visually inspected.
 5. Moisture content of straw and coconut fibers measured upon receipt.
 6. At a minimum, every third roll shall be weighed to ensure conformance of manufacturer's specifications.
 7. Each individual erosion control blanket shall be inspected prior to packaging for conformance to manufacturing specifications.

1.06 PERFORMANCE REQUIREMENTS FOR EROSION CONTROL BLANKETS

- A. Erosion control blanket shall provide a temporary, biodegradable cover material to reduce slope and enhance vegetation. Erosion control blanket performance capabilities shall be in accordance with ASTM D6459, "Determination of Erosion Control Blanket (ECB) Performance in Protecting Hillslopes from Rainfall-Induced Erosion."

PART 2 PRODUCTS

2.01 FILTER FABRIC

- A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.
- B. Geotextile fabric:
 1. Grab strength of 100 pounds per square inch in any principal direction in accordance with ASTM D4632.
 2. Puncture strength exceeding 115 pounds per square inch in accordance with ASTM D4833.
 3. Equivalent opening size between 50 and 140 for soils with more than 15 percent by weight passing No. 200 sieve and between 20 and 50 for soil with less than 15 percent by weight passing No. 200 sieve.
 4. Maximum water flow rate of 40 gallons per minute per square feet in accordance with ASTM D4491.

- C. Filter fabric material shall contain ultraviolet inhibitors and stabilizers to provide expected usable life comparable to anticipated construction period.
 - 1. Ultraviolet stability shall exceed 70 percent after 500 hours of exposure in accordance with ASTM D4355.
- D. Manufacturers: The following or equal:
 - 1. Mirafi, Inc.

2.02 EROSION CONTROL BLANKETS

- A. Manufacturers: One of the following, or equal:
 - 1. American Excelsior Co., AEC Premier Straw/Coconut™ Blankets.
 - 2. Proper Geotextile Systems.
- B. Product requirements:
 - 1. Furnished in rolls and wrapped with suitable material to protect against moisture intrusion and extended ultraviolet exposure prior to placement.
 - 2. Consistent thickness with fibers distributed evenly over the entire area of the blanket.
 - 3. Free of defects and voids that would interfere with proper installation or impair performance.
- C. Materials:
 - 1. Blend of 70 percent straw and 30 percent coconut fibers.
 - a. Straw fibers shall consist of straw with 75 percent of fibers greater than 4 inches in length, and certified weed seed free.
 - b. Product shall be 100 percent biodegradable.
 - c. Blended fibers shall be evenly distributed throughout the entire area of the blanket.
 - d. Top and bottom of each blanket is covered with biodegradable jute netting.
 - 2. Blanket performance requirements:
 - a. C factor: 0.15.
 - b. Shear stress: 2.0 lb/ft².
 - c. Velocity: 8.5 feet per second.
 - d. Functional longevity: Less than 24 months.
 - 3. Material characteristics:
 - a. Width: 8.0 feet.
 - b. Length: 112.5 feet.
 - c. Area: 100.0 yard².
 - d. Weight: 50.0 pounds.
 - e. Mass per unit area: 0.50 lb/yd².
 - f. Net openings: 0.5 inch by 1.0 inch.
 - g. Minimum index values:

Index Property	Test Method	Value
Thickness	ASTM D6525	0.331 in (8.41 mm)
Light Penetration	ASTM D6567	5.8 percent
Mass per Unit Area	ASTM D6475	0.81 lb/yd ² (437 g/m ²)
MD-Tensile Strength Max.	ASTM D6818	321.6 lb/ft (4.69 kN/m)

Index Property	Test Method	Value
TD-Tensile Strength Max.	ASTM D6818	159.6 lb/ft (2.33 kN/m)
MD-Elongation	ASTM D6818	4.1 percent
TD-Elongation	ASTM D6818	4.8 percent
Water Absorption	ASTM D5665	382 percent

- D. Staples:
1. 100 percent biodegradable with a U-shaped top.
 2. Minimum 4 inch biodegradable staple for cohesive soils and 6 inches for non-cohesive soils.

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. Provide erosion and sediment control systems at locations as indicated on the Drawings.
1. Construct in accordance with requirements as indicated on the Drawings and of type indicated as specified in this Section.
- B. No clearing, grubbing or rough cutting permitted until erosion and sediment control systems are in place, other than site work specifically directed by Project Manager to allow soil testing and surveying.
- C. Maintain existing erosion and sediment control systems located within Project site until acceptance of Project or until directed by Project Manager to remove and discard existing system.
- D. Regularly inspect and repair or replace damaged components of erosion and sediment control systems as specified in this Section.
1. Unless otherwise directed, maintain erosion and sediment control systems until Project area stabilization is accepted by the Authority.
 2. Remove erosion and sediment control systems promptly when directed by Project Manager.
 3. Discard removed materials off site.
- E. Remove and dispose sediment deposits at designated spoil site for Project.
1. If a Project spoil site is not indicated on the Drawings, dispose of sediment off site at location not in or adjacent to stream or floodplain.
 2. Assume responsibility for off-site disposal.
 3. Spread sediment evenly throughout site, compacted and stabilized.
 4. Prevent sediment from flushing into a stream or drainage way.
 5. If sediment has been contaminated, dispose of in accordance with existing federal, state, and local rules and regulations.

- F. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8-inch layers.
 - 1. Compaction density shall be at a minimum of 90 percent Standard Proctor ASTM D698 density.
 - 2. Make at least 1 test per 500 cubic yards of embankment.
- G. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction.
 - 1. Immediately repair damage caused by construction traffic to erosion and sediment control.
- H. Conduct construction operations under this Contract in conformance with erosion control practices.

3.02 GENERAL CONSTRUCTION METHODS

- A. Provide erosion and sedimentation control systems as indicated on the Drawings.
 - 1. Install erosion and sedimentation control systems in manner that surface runoff shall percolate through system in sheet flow fashion and allow retention and accumulation of sediment.
- B. Inspect erosion and sedimentation control systems after each rainfall, daily during periods of prolonged rainfall, and at minimum once each week.
 - 1. Repair or replace damaged sections immediately.
 - 2. Remove sediment deposits when silt reaches depth 1/3 height of fence or 6 inches, whichever is less.

3.03 SITE PREPARATION FOR EROSION CONTROL BLANKETS

- A. Before placing erosion control blanket, certify that the subgrade has been properly compacted, graded smooth, has no depressions, voids, soft or uncompacted areas, is free from obstructions such as tree roots, protruding stones or other foreign matter, and is seeded and fertilized according to Project specifications.
 - 1. Contractor shall not proceed until unsatisfactory conditions have been remedied.
 - 2. By beginning construction, Contractor signifies that the proceeding work is in conformance with this Section.
- B. Fine grade the subgrade by hand dressing where necessary to remove local deviations.
- C. No vehicular traffic shall be permitted directly on the erosion control blanket.
- D. Slope installation.
 - 1. Erosion control blanket shall be installed as directed by Owner's representative in accordance with manufacturer's Installation Guidelines, Staple Pattern Guides, and CAD details. The extent of erosion control blanket shall be as indicated on the Drawings.

2. Erosion control blanket shall be oriented in vertical strips and anchored with staples, as identified in the Staple Pattern Guide.
 - a. Adjacent strips shall be overlapped to allow for installation of a common row of staples that anchor through the nettings of both blankets.
 - b. Horizontal joints between erosion control blankets shall be sufficiently overlapped with the uphill end on top for a common row of staples so that the staples anchor through the nettings of both blankets.
3. Where exposed to overland sheet flow, a trench shall be located at the uphill termination erosion control blanket shall be stapled to the bottom of the trench.
 - a. Trench shall be backfilled and compacted.
 - b. Where feasible, the uphill end of the blanket shall be extended 3 feet over the crest of the slope.

3.04 FILTER FABRIC FENCE CONSTRUCTION METHODS

- A. Attach filter fabric to 1-inch by 2-inch wooden stakes or driven steel rods spaced a maximum of 3 feet apart and embedded minimum of 8 inches or deeper to hold fence in place.
 1. If filter fabric is factory preassembled with support netting, then maximum spacing allowable is 8 feet.
 2. Install anchoring stakes or rods at slight angle toward source of anticipated runoff.
 3. Contractor is responsible for providing adequate fence anchoring appropriate for the varying soil and rock conditions at the well sites.
- B. Trench in toe of filter fabric fence with spade or mechanical trencher so that downward face of trench is flat and perpendicular to direction of flow.
 1. V-trench configuration as indicated on the Drawings may also be used.
 2. Lay filter fabric along edges of trench.
 3. Backfill and compact trench.
- C. Filter fabric fence shall have a minimum height of 18 inches and a maximum height of 36 inches above natural ground.
- D. Provide filter fabric in continuous rolls and cut to length of fence to minimize use of joints.
 1. When joints are necessary, splice fabric together only at support post with minimum 6-inch overlap and seal securely.

3.05 STRAW BALE FENCE CONSTRUCTION METHODS

- A. Bound bales with either wire, nylon or polypropylene rope tied across hay bales.
 1. Do not use jute or cotton bindings.
- B. Place bales in row with ends tightly abutting adjacent bales.
 1. Place bales with bindings parallel to ground surface.
- C. Embed bale in soil a minimum of 4 inches.

- D. Securely anchor bales in place by 3/8-inch rebar stakes driven through bales a minimum of 18 inches into ground.
 - 1. Angle first stake in each bale toward previously laid bale to force bales together.
- E. Fill gaps between bales with straw to prevent water from escaping between bales.
 - 1. Wedge carefully in order not to separate bales.
- F. Replace with new straw bale fence every 2 months.

3.06 BRUSH BERM CONSTRUCTION METHODS

- A. Construct brush berm along contour lines by hand placing method.
 - 1. Do not use machine placement of brush berm.
- B. Use woody brush and branches having diameter less than 2 inches with 6 inches overlap.
 - 1. Avoid incorporation of annual weeds and soil into brush berm.
- C. Use minimum height of 18-inches measured from top of existing ground at upslope toe to top of berm.
 - 1. Top width shall be 24 inches minimum and side slopes shall be 2:1 or flatter.
- D. Embed brush berm into soil a minimum of 4 inches and anchor using either wire, nylon or polypropylene rope across berm with a minimum tension of 50 pounds.
 - 1. Tie rope securely to 18-inch by 3/8-inch diameter rebar stakes driven into ground on 4-foot centers on both sides of berm.

END OF SECTION

SECTION 01601

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for products.

1.02 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when this Section is referenced in other Specifications, have the indicated meaning.
 - 1. Manufacturer's Certificate of Source Testing:
 - a. Form used to confirm that the applicable source tests have been performed and the results conform to the Contract Documents. Form template is provided at the end of this Section.
 - 2. Manufacturer's instructions:
 - a. Stipulations, directions, and/or recommendations issued by the manufacturer of the product addressing handling, storage, installation, protection, erection, and/or application of the product.
 - 3. Product data:
 - a. Information about the product, typically found in the manufacturer's catalogs specifications or other resources, including data sheets, bulletins, and brochures.
 - 4. Source Quality Control:
 - a. Testing and inspections at the location of fabrication or assembly.
 - 1) Includes factory acceptance testing (FAT), factory testing, and Source Testing.
 - b. Test reports, including the following information:
 - 1) Test description.
 - 2) List of equipment used.
 - 3) Name of the person conducting the test.
 - 4) Date and time the test was conducted.
 - 5) Ambient temperature and weather conditions.
 - 6) Raw data collected.
 - 7) Calculated results.
 - 8) Clear statement if the test passed or failed the requirements stated in the Contract Documents.
 - 9) Signature of the person responsible for the test.
 - 5. Special tools:
 - a. Special wrenches, gauges, circuit setters, and other similar devices required for the proper operation or maintenance of a system that would not normally be in the Owner's tool kit and that have been specifically made for use on a product for assembly, disassembly, repair, or maintenance.

1.03 QUALITY CONTROL

- A. Manufacturer shall provide a permanent quality control department and laboratory facility capable of performing inspections and testing as required by the Contract Documents.
 - 1. Material testing, inspection procedures, and manufacturing process are subject to inspection by the Engineer.
 - 2. Notify the Engineer in writing of the manufacturing start date, not less than 14 days prior to the start, of the manufacturer of project pipe.
 - 3. Perform manufacturer's tests and inspections required by the referenced standards and as specified in this Section, including the following:
 - a. Calibration within last 12 months for equipment such as scales, measuring devices and calibration tools used in the manufacturing of pipe as required by ISO 9001.
 - 1) Each device used in the manufacturer of pipe is required to have a tag recording date of last calibration.
 - 2) Provide calibration certificate.
 - 3) Devices are subject to inspection by the Engineer.
 - 4. Provide Manufacturer's Certificate of Source Testing.

1.04 SERVICES OF MANUFACTURER'S REPRESENTATIVES

- A. Qualifications of manufacturer's representative include the following:
 - 1. Authorized representative of the manufacturer, factory trained and experienced in the technical applications and installation of respective products with full authority by the product manufacturer to issue the certifications required of the manufacturer.
 - 2. Competent, experienced technical representative of the product manufacturer for installation.
 - 3. Additional qualifications may be specified in the Technical Sections.
 - 4. No substitute representatives will be allowed until written approval by the Owner and Engineer has been obtained.
- B. Completion of manufacturer on-site services: Engineer approval required.
 - 1. Manufacturer's representative will advise aspects of installation, including, but not limited to:
 - a. Handling.
 - b. Storing.
 - c. Cleaning and inspecting.
 - d. Coating and lining repairs.
 - e. Tapping.
 - f. General construction methods.
- C. Manufacturer is responsible for determining the time required to perform the specified services.
 - 1. No additional costs associated with performing the required services will be approved.
 - 2. Manufacturer required to schedule services in accordance with the Contractor's Project schedule, up to and including making multiple trips to the Project Site when there are separate milestones associated with installation of each occurrence of the manufacturer's product.

- D. Manufacturer's on-site services include the following:
 - 1. Assistance during construction.
 - 2. Provide 1 copy of daily manufacturer's representative's field notes and data to the Engineer.
 - 3. Other requirements as specified in the Contract Documents.

1.05 GENERAL TEST REQUIREMENTS

- A. Testing prerequisites:
 - 1. Prior to testing, verify equipment protective devices and safety devices have been installed, calibrated, and tested.
- B. Test Plan requirements:
 - 1. As specified in this Section and the Technical Sections.
 - 2. Prepared by the Contractor as a result of discussions and planning emerging from regularly conducted meetings for test planning.
 - 3. Define the following for each test:
 - a. Purpose of the test.
 - b. Identification of each item of equipment/system, including system designation, location, tag number, control loop identifier, etc.
 - c. Description of the pass/fail criteria that will be used.
 - d. Listing of pertinent reference documents (Contract Documents or industry standards applicable to the testing).
 - e. Credentials of test personnel.
 - f. Test equipment:
 - 1) Product data.
 - 2) Appropriate calibration records.
 - 3) Drawings or photographs of test stands and/or test apparatus.
 - g. Duration: Determine test durations with the Owner's input.
 - h. Detailed step-by-step test procedures.
 - 1) Setup.
 - 2) Level of detail shall be sufficient for any witness with a rudimentary technical aptitude to be able to follow the steps and develop confidence that the tests were being performed as planned.
 - 3) Include all steps in the procedures.
 - 4) Define temporary systems (pumps, piping, etc.), shutdown requirements for existing systems.
 - 5) Furnish labor, power, tools, equipment, instruments, and services required for and incidental to completing testing activities.
 - i. Test forms: Include, but not limited to, the following information:
 - 1) Name of product to be tested.
 - 2) Test date.
 - 3) Names of persons conducting the test.
 - 4) Names of persons witnessing the test, where applicable.
 - 5) Test data.
 - 6) Applicable Project requirements.
 - 7) Check offs for each completed test or test step.
 - 8) Place for signature of person conducting tests and for the witnessing person, as applicable.

- C. Submit Test Plan.
 - 1. Submit forms as specified in the Technical Sections.
 - 2. Submit a copy of the Test Plan at least 21 days before any scheduled test date.
 - 3. Engineer approval of Test Plan required prior to beginning testing.
- D. Request proposed test dates.
 - 1. Notify the Engineer of the scheduled tests a minimum of 15 days before the date of the test.
- E. Implement approved Test Plans.
 - 1. Demonstrate the product performance meets the requirements stated in the Contract Documents.
 - a. When the product fails to meet the specified requirements, perform additional, more detailed, testing to determine the cause, correct, repair, or replace the causative components and repeat the testing that revealed the deficiency.
- F. Submit Test Report.

1.06 SOURCE TESTING

- A. As specified in Section 01450 - Quality Control.
- B. Also referred to as factory testing or factory acceptance testing (FAT).
- C. Source Test Plan:
 - 1. As specified in this Section and other Technical Sections.
 - 2. Purpose: Test products for proper performance at point of manufacture or assembly as specified in the Technical Sections.
 - 3. Source Testing requirements as specified in Technical Sections.
 - a. Non-witnessed:
 - 1) Provide completed Attachment A - Manufacturer's Certificate of Source Testing.
 - b. Witnessed:
 - 1) 2 Owner's representatives and 2 Engineer's representatives present during testing, unless otherwise specified.
 - 2) Provide completed Attachment A - Manufacturer's Certificate of Source Testing.
 - 4. Duration: Define.
 - 5. Contractor is responsible for providing fuel, chemicals, and other consumables needed for Source Testing.
- D. Contractor is responsible for witness trip costs associated with the Owner's and Engineer's representatives.
 - 1. Include costs for at least the following:
 - a. Transportation:
 - 1) Travel on commercial airline to and from Site, including related fees.
 - 2) Rental car to and from airport, hotel, and test site, including related fees.

- b. Hotel/meals:
 - 1) Hotel costs at a facility with an American Automobile Association 4-star rating or higher equivalent for single occupancy room per person per day.
 - 2) Meal allowance based on government per diem guidelines per location.
- c. Witness labor costs:
 - 1) The greater of \$200 per hour or \$1,600 per day.
- 2. If the Source Test is not ready when the witnesses arrive or if the Source Test fails, the witnesses will return home with the Contractor responsible for costs associated with the trip, including costs described above.
 - a. Contractor is responsible for rescheduling the Source Test and witnesses' costs associated with the second trip, including costs described above.
 - b. Contractor is responsible for witnesses' costs associated with retests, including costs described above.

1.07 INSTALLATION VERIFICATION

- A. Installation Verification plan:
 - 1. Confirm piping:
 - a. Has been properly installed, adjusted, and aligned.
 - b. Is free of any stresses imposed by connecting piping or anchor bolts.
 - c. Is able to be operated as necessary for Functional Testing.
 - 2. Field test backfill, welded joints, alignment and grade, and pipeline pressure as specified in the Technical Sections.
 - 3. Duration: Define.
 - 4. Coordinate Installation Verification with restrictions and requirements as specified in Section 01140 - Work Restrictions.

1.08 FUNCTIONAL TESTING

- A. Functional Test Plan:
 - 1. Purpose: Test piping system to verify conformance with the Contract Documents.
 - 2. Duration: Define.
 - 3. Perform testing in the presence of the Engineer.
 - 4. Contractor is responsible for providing fuel, chemicals, and other consumables needed.
 - 5. Coordinate Functional Testing with restrictions and requirements as specified in Section 01140 - Work Restrictions.

1.09 SHIPMENT

- A. Prepare products for shipment by:
 - 1. Tagging or marking to match the Shop Drawings or Contract Documents.
 - 2. Including complete packing lists and bills of material with each shipment.
 - 3. Packaging products to facilitate handling and protection against damage during transit, handling, and storage.
 - 4. Securely attach special instructions for proper field handling, storage, and installation before packaging and shipment.

- B. Transport products by methods that avoid product damage.
- C. Deliver products in undamaged condition in the manufacturer's unopened packaging.

1.10 DELIVERY AND HANDLING

- A. Handle products in accordance with the manufacturer's instructions.
- B. Deliver products in undamaged condition in the manufacturer's unopened packaging.
- C. Provide construction equipment and personnel to handle products by methods in accordance with the manufacturer's instructions.
- D. Upon delivery, promptly inspect shipments:
 - 1. Verify compliance with the Contract Documents, correct quantities, and undamaged condition of products.
 - 2. Acceptance of shipment does not constitute final acceptance of products.

1.11 STORAGE

- A. Immediately store and protect products until installed in the Work.
- B. Store products with seals and legible labels intact.
- C. Protect painted or coated surfaces against impact, abrasion, discoloration, and damage.
- D. Storage of spare parts, maintenance products, special tools.
 - 1. Immediately store in accordance with the manufacturer's instructions.
 - 2. Store spare parts, maintenance products, and special tools in an enclosed, weather-proof, and lighted facility during the construction period.
 - 3. Protect parts subject to deterioration, such as ferrous metal items and electrical components with appropriate lubricants, desiccants, or hermetic sealing.
 - 4. Store large items individually:
 - a. Weight: Greater than 50 pounds.
 - b. Size: Greater than 24 inches wide by 18 inches high by 36 inches long.
 - c. Clearly labeled:
 - 1) Equipment tag number.
 - 2) Equipment manufacturer.
 - 3) Subassembly component, if appropriate.
 - 5. Store smaller items in spare parts boxes:
 - a. Weight: Less than 50 pounds.
 - b. Size: Less than 24 inches wide by 18 inches high by 36 inches long.
 - c. Clearly labeled:
 - 1) Equipment tag number.
 - 2) Equipment manufacturer.
 - 3) Subassembly component, if appropriate.
 - 6. Spare parts and special tools box:
 - a. Box material: Waterproof, corrosion resistant.
 - b. Hinged cover with locking hasp:
 - 1) Inventory list taped to underside of cover.

- 2) Clearly labeled:
 - a) "Spare Parts and/or Special Tools".
 - b) Equipment tag number.
 - c) Equipment manufacturer.
 - d) Subassembly component, if appropriate.
- E. Exterior storage of fabricated products:
 - 1. Place on aboveground supports that allow for drainage.
 - 2. Cover products subject to deterioration with impervious sheet covering.
 - 3. Provide ventilation to prevent condensation under covering.
- F. Store moisture sensitive products in watertight enclosures.
- G. Store loose granular materials on solid surfaces in well-drained area.
 - 1. Prevent materials mixing with foreign matter.
 - 2. Provide access for inspection.
- H. When needed and approved by the Engineer, offsite storage location shall be within 20 miles of the Project Site.
 - 1. Provide proof of insurance coverage for products stored offsite.
- I. Payment will not be made for products improperly stored or stored without providing the Engineer with the manufacturer's instructions for storage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide products by the same manufacturer when units are of similar nature, unless otherwise specified.
- B. Provide like parts of duplicate units that are interchangeable.
- C. Provide equipment or products that have not been in service prior to delivery, except as required by tests.
- D. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
 - 1. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- E. Provide products produced by manufacturers regularly engaged in the production of these products.
- F. Provide products that bear approvals and labels as specified such as Factory Mutual (FM), Underwriters Laboratory (UL), or National Sanitation Foundation (NSF International) that are acceptable to the Authority Having Jurisdiction.

2.02 MATERIAL

- A. Dissimilar metals:
 - 1. Separate contacting surfaces with dielectric material.
 - 2. Neoprene, bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators, washers, petrolatum tape, or other materials as specified.
 - 3. Dielectric coatings can be used to separate dissimilar metal couples from surrounding environment if isolation of metals is not possible, with approval of the Engineer.
- B. Edge grinding:
 - 1. Sharp projections of cut or sheared edges of ferrous metals which are not to be welded shall be ground to a radius required to ensure satisfactory paint adherence and mitigate any safety hazard.
 - 2. A surface profile will need to be re-established for coating adherence based on coating manufacturer's profile requirements.
- C. Use anti-galling compound on threads of stainless steel fasteners during factory assembly.
- D. Provide anti-galling compound with stainless steel fasteners shipped for field assembly.
- E. Aluminum in contact with concrete or masonry: Apply epoxy mastic as specified in Section 09960 - High-Performance Coatings, coating system EPX-M-5.

2.03 PRODUCT SELECTION

- A. When products are specified without named manufacturers, provide products that meet or exceed the Specifications.
- B. When products are specified with names of manufacturers but no model numbers or catalog designations, provide products by one of the named manufacturers that meet or exceed specifications.
- C. When products are specified with names of manufacturers and model numbers or catalog designations, provide products with model numbers or catalog designations by one of the named manufacturers.
- D. When products are specified with names of manufacturers, but with brand or trade names, model numbers, or catalog designations by one manufacturer only, provide:
 - 1. Products specified by brand or trade name, model number, or catalog designation.
 - 2. Products by another named manufacturer proven, in accordance with requirements for an "or equal", including the Engineer's approval, to meet or exceed quality, appearance and performance of specified brand or trade name, model number, or catalog designation.
- E. When products are specified with only one manufacturer followed by "or equal," provide:
 - 1. Products meeting or exceeding specifications by specified manufacturer.

2. Engineer deemed “or equal” evidenced by an approved Shop Drawing or other written communication.
- F. When products are specified by naming 2 or more manufacturers with 1 manufacturer as a “Basis of Design”:
1. Any of the named manufacturers can be submitted.
 2. If the product submitted is not by the named “Basis of Design” product and requires a change in the scope (dimensions, configuration, physical properties, etc.), schedule (longer lead time), or budget, the Contractor must submit a substitution request.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Inspect equipment or products prior to installation.
- B. Repaint or recoat damaged painted or coated surfaces after installation.
- C. Use anti-galling compound on stainless steel threads used for field assembly.

3.02 PROTECTION AFTER INSTALLATION

- A. Provide coverings as necessary to protect installed products from damage due to traffic and subsequent construction operations.
 1. Remove covering when no longer needed.
 2. Replace corroded, damaged, or deteriorated products before acceptance of the Project.

END OF SECTION

ATTACHMENT A - MANUFACTURER'S CERTIFICATE OF SOURCE TESTING

MANUFACTURER'S CERTIFICATE OF SOURCE TESTING

OWNER _____ EQPT/SYSTEM _____
PROJECT NAME _____ EQPT TAG NO. _____
PROJECT NO. _____ EQPT SERIAL NO. _____
SPECIFICATION NO. _____
SPECIFICATION TITLE _____

Comments: _____

I hereby certify Source Testing has been performed on the above-referenced product as defined in the Contract Documents, and the results conform to the Contract Document requirements. Testing data is attached.

Date of Execution: _____

Manufacturer: _____

Manufacturer's Authorized Representative Name (*print*): _____

(Authorized Signature)

If applicable, Witness Name (*print*): _____

(Witness Signature)

SECTION 01756

COMMISSIONING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Commissioning.

1.02 DEFINITIONS

- A. Commissioning: The process of planning for, testing of, and start-up of systems, subsystems, equipment, components, and devices of the Work to demonstrate, through documented verification, that the Work has successfully met the Contract Documents.
- B. Commissioning Phases: The activities of commissioning are grouped into the phases defined in the following table.
 - 1. Table 1 - Commissioning Phases.

TABLE 1 - COMMISSIONING PHASES		
Planning Phase	Testing and Training Phase	Start-Up Phase
Draft Test Plans	Source Testing: <ul style="list-style-type: none">• Documentation	Start-Up: <ul style="list-style-type: none">• Documentation• Owner Training
	Installation Verification: <ul style="list-style-type: none">• Documentation• Owner Training	
	Functional Testing: <ul style="list-style-type: none">• Documentation• Owner Training	

- 2. Attachment A provides Commissioning Flowcharts.
- C. Component: A part of a system that does not have an electrical connection or internal electronics. Examples: Piping and pressure gauges.
- D. Device: A part of a system that has electrical connections or internal electronics. Examples: Level transmitter or pressure transmitter.
- E. Electrical Energization Plan: A plan to manage how and when power is applied to electrical equipment.
- F. Equipment: A factory or field assembled apparatus that performs an identifiable function. Examples: Pumps, motors, VFDs, MCCs.

- G. Functional Testing: Testing performed on a completed subsystem or system to demonstrate that the system meets the specified requirements. Example systems: Backwash system, dewatering system.
- H. Installation Verification: Testing to demonstrate that equipment or system and associated components or devices have been properly installed. Example equipment: Pumps, meters, and blowers with associated piping.
- I. Manufacturer's Certificate of Functional Compliance: The form completed by the manufacturer to confirm that testing of the installed equipment or system has been performed and the results conform to the specified performance. The form is provided in Attachment D provided at the end of this Section.
- J. Manufacturer's Certificate of Installation Verification: The form completed by the manufacturer to confirm that the equipment or system is installed in conformance with the Contract. The form is provided in Attachment C at the end of this Section.
- K. Manufacturer's Certificate of Source Testing: The form completed by the manufacturer to confirm that the specified source tests have been performed and the results conform to the specified requirements. The form is provided in Attachment B at the end of this Section.
- L. Owner Training: The Owner's staff is trained by the Contractor, with assistance from manufacturer, to operate and maintain the completed Work. This is sometimes referred to as Vendor Specific Training.
- M. Process Stream: A series of liquid or solids flow processes that are designed to improve the water quality to meet regulatory permit requirements.
- N. Source Testing: Test equipment or products for performance at point of manufacture or assembly for the requirements specified in the Contract Documents. Also referred to as factory testing and factory acceptance testing (FAT).
- O. Start-Up: Operating the Work with process water to verify the Work meets the Contract Documents.
- P. Start-Up Phase: The phase when Start-Up occurs.
- Q. Subsystem: A grouping of equipment, components, and devices that is a part of a larger system and that perform a single definable function. Examples: Sand filters, filter backwash.
- R. System: A grouping of equipment, components, and devices that perform a single definable function. If a system is a part of a larger system, it is referred to as a subsystem.
 - 1. Examples: Flocculation and sedimentation, filtration.
- S. System Testing: Testing of a completed system for an extended time period. Examples: Headworks, filtration.

- T. Water Management Plan: A plan to manage the test water used for commissioning from source to disposal. The test water may be clean water, potable water, non-potable water, or process water (e.g., raw water, plant water, sludge). The plan demonstrates how water will be produced, conveyed, treated, disposed of as directed by the plant manager, and/or recycled.

1.03 SUBMITTALS

- A. Project Commissioning:
 - 1. Commissioning Coordinator's qualifications.
 - a. Submit to Engineer no later than 30 days after Notice to Proceed.
 - b. Describe previous similar experience on similar projects with a list of references, including phone numbers.
 - c. Provide names and qualifications of commissioning assistants, if applicable.
 - 2. Schedules:
 - a. Commissioning Schedule containing all commissioning activities.
 - b. Owner Training Schedule.
 - 3. Test Plans:
 - a. Submit draft Test Plan outlined in the Planning Phase, unless specified otherwise.
 - 1) Engineer approval of draft Test Plans required for successful completion of Planning Phase.
 - b. Submit final Test Plan a minimum of 30 calendar days prior to testing.
 - c. Engineer approval of final Test Plan required prior to start of testing.
 - 4. Test Reports:
 - a. Submit draft Test Reports outline in the Planning Phase, unless specified otherwise.
 - 1) Engineer approval of draft Test Reports outline required for successful completion of Planning Phase.
 - b. Submit final Test Report a maximum of 30 calendar days after testing.

1.04 MANUFACTURER'S REPRESENTATIVES

- A. Qualifications: As specified below and in the Technical Sections:
 - 1. For Installation and Functional Testing:
 - a. Factory trained and experienced in the technical applications, installation, operation, and maintenance of respective equipment/system with full authority by the equipment/system manufacturer to issue the certifications required of the manufacturer.
 - 2. Training instructor qualifications:
 - a. Provide resume stating instructor's technical preparation and instructional technology skills and experience.
 - b. If CEUs are required, the operator training instructors must comply with state regulatory.
 - c. Knowledgeable in the equipment/system for which they are training.
 - d. Experienced in conducting classes.
 - e. Sales representatives are not qualified instructors unless they possess the detailed operating and maintenance knowledge required for proper class instruction.
 - 3. Representatives to be approved by Owner and Engineer.

4. No substitute representatives without written approval by Owner and Engineer.
- B. Duties:
1. Determine if additional time and/or trips (beyond those specified in the Technical Sections) is required to perform the specified services.
 2. Coordinate services in accordance with the Contractor's Project schedule, up to and including making multiple trips to the Project Site when there are separate milestones associated with installation of each occurrence of manufacturer's equipment.
 3. Perform on-site services as specified in the Technical Sections.
 4. Provide copies of manufacturer's representatives field notes and data to Contractor.

1.05 PLANNING PHASE

- A. Overview of Planning Phase:
1. Define approach and timing for Commissioning.
 2. Obtain Engineer approval of draft Test Plans.
- B. Test Plans:
1. Define approach and timing for:
 - a. Testing and Training Phases.
 - 1) Major systems, with separate plans for each system.
 - b. Start-Up Phase.
 2. Owner responsibilities:
 - a. Owner will schedule staff within the constraints of their workloads.
 - 1) Those who will participate in this test have existing full-time work assignments, and testing is an additional assigned work task, therefore, scheduling is imperative.
 - 2) Treatment facilities are typically operated on an around-the-clock basis and are staffed in work shifts.
 - 1) Maximum hours per day available for commissioning activities: 8.
 - 2) Days available for commissioning activities: Tuesday to Thursday.
 - 3) Scheduling coordination with the CC.
- C. Test Reports:
1. Minimum requirements:
 - a. Title.
 - b. Abstract.
 - c. Equipment.
 - d. Procedures.
 - e. Results.
 - 1) Complete disclosure of the calculation methodologies.
 - f. Conclusions.
 - g. Signature by an authorized party.
 - h. Appendices.
 - 1) Completed test forms signed by witnesses.

2. Water Management Plan:
 - a. Requirements:
 - 1) Demonstrate how water will be produced, conveyed, treated, recycled, and or disposed until testing verifies specified requirements.
3. Commissioning Schedule:
 - a. Content:
 - 1) Comply with Attachment G - Functional Testing Requirements and provide activities organized by system and subsystem.
 - 2) Include:
 - a) Source Testing when required.
 - b) Functional Testing.
 - c) Owner Training.
 - 3) Comply with Attachment F - Commissioning Roles and Responsibilities Matrix.

1.06 TESTING AND TRAINING PHASE

- A. Overview of Testing and Training Phase:
 1. General:
 - a. Contractor tests the Work to verify it meets the Contract requirements.
 - b. Contractor trains the Owner to operate and maintain the Work.
- B. Documentation:
 1. Provide records generated during Commissioning Phase of Project, including, but not limited to:
 - a. Training documentation.
 - b. Test forms and documentation.
 - c. Functional Testing results.
 - d. Due date: Within 14 calendar days of Substantial Completion.
 2. Engineer approval of documentation is required.
 3. Submittals:
 - a. Submit Training Plan Schedule 30 calendar days before the first scheduled training session, including, but not limited to, lesson plans, participant materials, instructor's resumes, and training delivery schedules.
 - b. Submit training documentation, including the following:
 - 1) Training plan:
 - a) Training modules.
 - b) Scope and sequence statement.
 - c) Contact information for manufacturer's instructors. including name, phone, and e-mail address.
 - d) Instructor qualifications.
 - 2) Training program schedule:
 - a) Format: Bar chart:
 - (1) Include in the Project Progress Schedule.
 - b) Contents:
 - (1) Training modules and classes.

1.07 START-UP PHASE

- A. Overview of Start-Up Phase:
 - 1. General:
 - a. Confirm reliability requirements.

- B. Start-Up Period:
 - 1. Contractor responsibilities:
 - a. Support Owner to operate the Work.
 - 2. Owner responsibilities:
 - a. Owner to operate the Work.
 - b. Owner-provided services, equipment, and/or materials to be as specified in Section 01110 - Summary of Work.
 - 3. Prerequisites:
 - a. Engineer approval of Testing and Training Phase.
 - 4. Witnessed.
 - 5. Duration: 3 days.
 - 6. Engineer approval of Start-Up Period is required to achieve substantial completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01770
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Contract closeout requirements.

1.02 REFERENCES

- A. American Water Works Association (AWWA).

1.03 FINAL CLEANING

- A. Perform final cleaning prior to inspections for Substantial Completion.
- B. Employ skilled workers who are experienced in cleaning operations.
- C. Remove non-permanent protection and labels.

1.04 WASTE DISPOSAL

- A. Arrange for and dispose of surplus materials, waste products, and debris off-site:
 - 1. Prior to making disposal on private property, obtain written permission from the Owner of such property.
- B. Do not fill ditches, washes, or drainage ways which may create drainage problems.
- C. Do not create unsightly or unsanitary nuisances during disposal operations.
- D. Maintain disposal site in safe condition and good appearance.
- E. Complete leveling and cleanup prior to final completion of the Work.

1.05 CLOSEOUT DOCUMENTS

- A. Submit the following before Substantial Completion:
 - 1. Punch list of items to be completed or corrected with the request for issuance of Substantial Completion.
 - 2. Evidence of Compliance with Requirements of Governing Authorities.
 - 3. Project Record Documents.
 - 4. Approved Operation and Maintenance Manuals.
 - 5. Approved Warranties and Bonds.
 - 6. Keys and Keying Schedule.
 - 7. Completed Contract requirements for Commissioning and process Start-Up.

- B. Submit the following before final completion of the Work and at least 7 days prior to submitting Application for Final Payment:
 1. Punch list items have been completed and the Engineer and Owner are satisfied that all deficiencies are corrected.
 2. Evidence of Payment and Release of Liens or Stop Payment Notices as outlined in Conditions of the Contract.
 3. Release of claims as outlined in Conditions of the Contract.
 4. Submit certification of insurance for products and completed operations, as specified in the General Conditions.
 5. Final statement of accounting.

1.06 EVIDENCE OF COMPLIANCE WITH REQUIREMENTS OF GOVERNING AUTHORITIES

- A. Submit the following:
 1. Certificates of Inspection:

1.07 PROJECT RECORD DOCUMENTS

- A. Maintain at the Project Site, available to the Owner and Engineer, 1 copy of the Contract Documents, Shop Drawings, and other Submittals in good order:
 1. Mark and record field changes and detailed information contained in Submittals and Change Orders.
 2. Record actual depths, horizontal and vertical location of underground pipes, duct banks, and other buried utilities. Reference dimensions to permanent surface features.
 3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.
 4. Identify location of spare conduits including beginning, ending, and routing through pull boxes and manholes. Record spare conductors, including number and size, within spare conduits and filled conduits.
 5. Provide schedules, lists, layout drawings, and wiring diagrams.
 6. Make annotations in electronic format in accordance with the following color code:

Additions:	Red
Deletions:	Green
Comments	Blue
Dimensions:	Graphite

- B. Maintain documents separate from those used for construction:
 1. Label documents "RECORD DOCUMENTS."
- C. Keep documents current:
 1. Record required information at the time the material and equipment is installed and before permanently concealing.
 2. Engineer will review Record Documents weekly to ascertain that changes have been recorded.

- D. Affix civil engineer's or professional land surveyor's signature and registration number to Record Drawings to certify accuracy of information shown.
- E. Deliver Record Documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of the Contractor.
- F. Record Documents will be reviewed monthly to determine the percent complete for the monthly pay application.
- G. Updated Record Documents are a condition for the Engineer's recommendation for progress payment.

1.08 MAINTENANCE SERVICE

- A. As specified in Technical Specifications.

1.09 SUBSTANTIAL COMPLETION

- A. Obtain Certificate of Substantial Completion.

1.10 FINAL COMPLETION

- A. When Contractor considers the Work is complete, submit written certification that:
 - 1. Work has been completed in accordance with the Contract Documents.
 - 2. Punch list items have been completed or corrected.
 - 3. Work is ready for final inspection.
- B. Engineer will make an inspection to verify the status of completion with reasonable promptness.
- C. Should the Engineer consider that the Work is incomplete or defective:
 - 1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective Work.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to the Engineer that the Work is complete.
 - 3. Engineer shall re-inspect the Work.

1.11 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Engineer at least 7 days prior to final Application for Payment.
- B. Statement shall reflect all adjustments to the Contract amount.
 - 1. The original Contract amount.
 - 2. Additions and deductions resulting from:
 - a. Change Orders.
 - b. Units installed and unit prices.
 - c. Set-offs for uncorrected or incomplete Work.
 - d. Set-offs for liquidated damages.
 - e. Set-offs for reinspection payments.
 - f. Extended engineering and/or inspection services and inspection overtime.

- g. Excessive Shop Drawings review cost by the Engineer.
 - h. Other adjustments.
 - 3. Total Contract amount, as adjusted.
 - 4. Previous payments.
 - 5. Remaining payment due.
- C. Engineer will prepare a final Change Order reflecting approved adjustments to the Contract amount which were not previously made by Change Orders.

1.12 FINAL APPLICATION FOR PAYMENT

- A. Submit the final Application for Payment reflecting the agreed upon information provided in the final statement of accounting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01783

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Warranty and bonds requirements.

1.02 SUBMITTALS

- A. For each item of material or equipment furnished under the Contract:
 - 1. Submit manufacturer's warranty prior to fabrication and shipment of the item from the manufacturer's facility.
 - 2. Submit manufacturer's special warranty when specified.
- B. Provide consolidated warranties and bonds within 15 calendar days of Substantial Completion.
 - 1. Contents:
 - a. Organize warranty and bond documents:
 - 1) Include Table of Contents organized by Specification Section number and the name of the product or work item.
 - b. Include each required warranty and bond in proper form, with full information, certified by manufacturer as required, and properly executed by Contractor, or subcontractor, supplier, or manufacturer.
 - c. Provide name, address, phone number, and point of contact of manufacturer, supplier, and installer, as applicable.
 - 2. Hardcopy format:
 - a. Submit 1 copies.
 - b. Assemble in 3 D-side ring binders with durable cover.
 - c. Identify each binder on the front and spine with typed or printed title "Warranties and Bonds"; Project Name or Title, and the Name Address and Telephone Number of the Contractor.
 - 3. Electronic copy in PDF format:
 - a. Submit 1 copy.

1.03 OWNER'S RIGHTS

- A. Owner reserves the right to reject warranties.
- B. Owner reserves the right to refuse to accept Work for the project if the required warranties have not been provided.

1.04 RELATIONSHIP TO GENERAL WARRANTY AND CORRECTION PERIOD

- A. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, both Contractor's general warranty and the correction period requirements.
- B. Disclaimers and limitations in specific materials and equipment warranties do not limit Contractor's general warranty, nor does such affect or limit Contractor's performance obligations under the correction period.

1.05 MANUFACTURER'S 1 YEAR WARRANTY MINIMUM REQUIREMENTS

- A. Written warranty issued by item's manufacturer.
- B. Project-specific information, properly executed by product manufacturer, and expressly states that its provisions are for the benefit of the Contractor.
- C. Covers all costs associated with the correction of the defect, including, but not limited to, removal of defective parts, new parts, labor, and shipping.
- D. Provides a timely response to correct the defect.
 - 1. Manufacturer shall provide, in a timely fashion, temporary equipment as necessary to replace warranted items requiring repair or replacement, when warranted items are in use and are critical to the treatment process, as defined by Owner.
- E. Warranty commence running on the date of substantial completion.
 - 1. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit warranty within 10 calendar days after acceptance, listing date of acceptance as beginning of warranty period.
- F. Duration of warranty: 1 year.

1.06 MANUFACTURER'S SPECIAL WARRANTY

- A. Manufacturer's special warranty is a written warranty published by the manufacturer which includes the requirements as specified in the Technical Section.
 - 1. Project-specific information and requirements.
 - 2. Properly executed by product manufacturer.
 - 3. Expressly states that its provisions are for the benefit of the Contractor or Owner.
 - 4. Manufacturer's special warranties commence on the date that the associated item is certified by Engineer as substantially complete.

1.07 WARRANTY WORK

- A. Contractor's responsibilities:
 - 1. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the product, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

- B. Replacement cost:
 - 1. Upon determination that work covered by warranty has failed, replace or rebuild the work to an acceptable condition complying with requirement of the Contract Documents.
 - a. Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether Owner has benefited from the use of the work through a portion of its anticipated useful service life.
- C. Related damages and losses:
 - 1. When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
- D. Owner's recourse:
 - 1. Written warranties are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitation on time in which Owner can enforce such other duties, obligations, rights, or remedies.
- E. Reinstatement of warranty:
 - 1. When work covered by a warranty has failed and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
 - a. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

1.08 IMPLIED WARRANTIES

- A. Warranty of title and intellectual rights:
 - 1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
 - 2. Provisions on intellectual rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.
- B. Implied warranties: Duration in accordance with Laws and Regulations.

1.09 BONDS

- A. Equipment bond and other bond requirements as specified in the Technical Sections.
- B. Bonds commence running on the date of substantial completion.
 - 1. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit warranty within 10 calendar days after acceptance, listing date of acceptance as beginning of bond period.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01850
DESIGN CRITERIA

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Design criteria for use in the selection of equipment and appurtenances specified in Technical Sections of these Specifications and indicated on the Drawings.
 - 2. Criteria for design of systems, components and equipment fabricated off site and shipped to the Work for installation.
 - 3. Criteria for design of anchors to connect equipment and appurtenances to supports and structures.

- B. The criteria in this Section apply throughout the Work, unless additional criteria, or more restrictive criteria, are indicated.
 - 1. Additional criteria and requirements relevant to specific locations, specific materials, and specific equipment are indicated on the Drawings, and in the Technical Sections.

1.02 REFERENCES

- A. American Society of Civil Engineers (ASCE):

- B. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):
 - 1. ASHRAE Fundamentals Handbook.

- C. International Code Council (ICC):
 - 1. International Energy Conservation Code (IECC).
 - 2. International Plumbing Code (IPC).

- D. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA):
 - 1. Seismic Restraint Manual: Guidelines for Mechanical Systems, 3rd edition 2008.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA - SITE INFORMATION

- A. Site name: West Weber Lift Station
 - 1. Street address: As specified in Section 01110 - Summary of Work.
 - a. Coordinates (approximate): Latitude 41.2596058931;
Longitude 112.0580577850.
 - 2. Site elevation (approximate):
 - a. 4,236 feet above mean sea level.

3. Groundwater elevation:
 - a. See Project geotechnical reports, listed in Document 00800 - Supplementary Conditions, for information.

2.02 DESIGN CRITERIA - REGULATORY REQUIREMENTS

- A. Requirements of authorities having jurisdiction over the Project are included in Section 01410 - Regulatory Requirements.

2.03 DESIGN CRITERIA - OPERATING ENVIRONMENT (NOT USED)

2.04 DESIGN CRITERIA - STRUCTURAL (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02001

COMMON WORK RESULTS FOR GENERAL PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Basic materials and methods for metallic and plastic piping systems.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME).
 - 1. B1.1 - Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms).
 - 2. B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
 - 3. B18.2.2 - Nuts for General Applications: Machine Screw Nuts; and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- B. American Water Works Association (AWWA):
 - 1. C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe.
 - 2. C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - 3. C230 - Stainless-Steel Full-Encirclement Repair and Service Connection Clamps for 2 In. Through 12 In. Pipe.
- C. ASTM International (ASTM):
 - 1. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 2. A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 3. A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 4. A536 - Standard Specification for Ductile Iron Castings.
 - 5. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 6. D2000 - Standard Classification System for Rubber Products in Automotive Applications.
 - 7. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements of Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- D. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
1. Buried pipes: Pipes that are buried in the soil with or without a concrete pipe encasement.
 2. Exposed pipe: Pipes that are located above ground, or located inside a structure, supported by a structure, or cast into a concrete structure.
 3. Pipes adjacent to a wet wall: Pipe centerline within 10 inches of the wet wall.
 4. Underground pipes: Buried pipes - see 1. above.
 5. Underwater pipes: Pipes below the top of walls in basins or tanks containing water.
 6. Wet wall: A wall with water on at least one side.

PART 2 PRODUCTS

2.01 GENERAL

- A. Pipes:
1. Provide new pipe.
 2. Piping provided from manufacturers/distributors inventory is subject to the following condition:
 - a. Provide proof pipe manufactured more than 6 months prior to delivery was stored properly and the material and/or coating was not subjected to ultraviolet (UV) degradation.
 3. Mark each piece of pipe in accordance with applicable standards.

2.02 LINK TYPE SEALS

- A. Characteristics:
1. Modular mechanical type, consisting of interlocking neoprene or synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
 2. Links to form a continuous rubber belt around the pipe.
 3. Provide a nylon polymer pressure plate with Type 316 stainless steel hardware. Isolate pressure plate from contact with wall sleeve.
 4. Hardware to be Type 316 stainless steel.
 - a. Provide anti-galling lubricant for threads.
- B. One of the following or equal:
1. Link-Seal.
 2. Pipe Linx.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
1. Piping drawings:
 - a. Except in details, piping is indicated diagrammatically. Not every offset and fitting, or structural difficulty that may be encountered has been indicated on the Drawings. Sizes and locations are indicated on the Drawings.
 - b. Perform minor modifications to piping alignment where necessary to avoid structural, mechanical, or other type of obstructions that cannot be removed or changed.
 - 1) Modifications are intended to be of minor scope, not involving a change to the design concept or a change to the Contract Price or Contract Times.
 2. Piping alternatives:
 - a. Provide piping as specified in this Section, unless indicated on the Drawings or specified otherwise.
 - b. Alternative pipe ratings:
 - 1) Piping with greater pressure rating than specified may be substituted in lieu of specified piping without changes to the Contract Price.
 - 2) Piping of different material may not be substituted in lieu of specified piping.
 - c. Valves in piping sections: Capable of withstanding specified test pressures for piping sections and fabricated with ends to fit piping.
 - d. Flanged joints: Where one of the joining flanges is raised face type, provide a matching raised face type flange for the other joining flange.
 3. Unless otherwise indicated on the Drawings, piping at pipe joints, fittings, couplings, and equipment shall be installed without rotation, angular deflection, vertical offset, or horizontal offset.
- B. Wall and slab penetrations:
1. Provide sleeves for piping penetrations through aboveground masonry and concrete walls, floors, ceilings, roofs, unless specified or otherwise indicated on the Drawings.
 2. For piping 1 inch in nominal diameter and larger, provide sleeves with minimum inside diameters of 1 inch plus outside diameter of piping. For piping smaller than 1 inch in nominal diameter, provide sleeve of minimum twice the outside diameter of piping.
 - a. Arrange sleeves and adjacent joints so piping can be pulled out of sleeves and replaced without disturbing the structure.
 - b. Cut ends of sleeves flush with surfaces of concrete, masonry, or plaster.
 - c. Conceal ends of sleeves with escutcheons where piping runs through floors, walls, or ceilings of finished spaces within buildings.
 - d. Seal spaces between pipes and sleeves with link-type seals when not otherwise specified or indicated on the Drawings.
 3. Provide flexibility in piping connecting to structures to accommodate movement due to soil settlement and earthquakes. Provide flexibility using details indicated on the Drawings.

4. Core drilled openings:
 - a. Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without acceptance by the Engineer.
 - b. Determine location of reinforcing bars or other obstructions with a non-destructive indicator device.
 - c. Remove dust and debris from hole using compressed air.

- C. Buried piping:
 1. With minimum 3-foot cover without air traps, unless otherwise indicated on the Drawings.
 2. Where 2 similar services run parallel to each other, piping for such services may be laid in the same trench.
 - a. Lay piping with sufficient room for assembly and disassembly of joints, for thrust blocks, for other structures, and to meet separation requirements of public health authorities having jurisdiction.
 3. Laying piping:
 - a. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.
 - b. Place piping with top or bottom markings with markings in proper position.
 - c. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.
 - d. Where joints require external grouting, banding, or pointing, provide space under and immediately in front of the bell end of each section laid with sufficient shape and size for grouting, banding, or pointing of joints.
 - e. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris or animals.
 4. Concrete encase buried pipe installed under the river.

- D. Venting piping under pressure:
 1. Lay piping under pressure flat or at a continuous slope without air traps, unless otherwise indicated on the Drawings.
 2. Install plug valves as air bleeder cocks at high points in piping.
 - a. Provide 1-inch plug valves for water lines and 2-inch plug valves for sewage and sludge lines, unless otherwise indicated on the Drawings.
 3. Provide additional pipe taps with plug cocks and riser pipes along piping as required for venting during initial filling, disinfecting, and sampling.
 4. Before piping is placed into service, close plug valves and install plugs.

- E. Connections to existing piping:
 1. Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings:
 - a. Protect domestic water/potable water supplies from contamination:
 - 1) Make connections between the domestic water supply and other water systems in accordance with requirements of public health authorities.
 - 2) Provide devices approved by the Owner of the domestic water supply system to prevent flow from other sources into the domestic supply system.
 2. Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.

3. Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.
4. For flanged connections, provide stainless steel bolts with isolation bushings and washers, and full-face flange gaskets.

3.02 CLEANING

- A. Piping cleaning:
 1. Upon completion of installation, clean piping interior of foreign matter and debris.
 2. Perform special cleaning when required by the Contract Documents.
- B. Conduct pressure and leak test, as specified.

3.03 PIPE SCHEDULE

- A. As indicated on the Drawings.

END OF SECTION

SECTION 02003

PIPE IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Pipe identification including the following:
 - 1. Pipe identification markers, flow direction arrows, tags, and bands.
 - 2. Underground warning tape.
 - 3. Tracer wire.
 - 4. Witness markers.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Submit following:
 - 1. Product data.
 - 2. Samples.
 - 3. Manufacturer's installation instructions.
 - 4. Submit following as specified in Section 01770 - Closeout Procedures:
 - a. Operation and Maintenance Data.
 - b. Warranty.

PART 2 PRODUCTS

2.01 BURIED PIPELINE IDENTIFICATION

- A. Underground warning tape:
 - 1. Manufacturer: One of the following or equal:
 - a. Seton (of Brady Corporation).
 - b. T. Christy Enterprises, Inc.
 - 2. Material:
 - a. Polyethylene tape for prolonged underground use.
 - b. Minimum tape thickness: 4 mils.
 - c. Overall tape width: 4 inches.
 - d. Message: "CAUTION" with the name of the service followed by "LINE BURIED BELOW." in black lettering on colored background in accordance with approved APWA colors.
 - e. Aluminum backing or solid aluminum core.

- B. Tracer wire:
 - 1. Manufacturers: One of the following or equal:
 - a. Kris-Tech Wire.
 - b. Aegion Corpro.
 - 2. Materials: One of the following or equal:
 - a. Solid copper conductor
 - b. Thickness minimum: 10 gauge.
 - c. Insulation:
 - 1) Match insulation color to the color of the pipe being installed.
 - 2) UF type, direct bury.
 - 3) 30 mil HMWPE.
 - 3. Splicing kit:
 - a. Manufacturers: One of the following or equal:
 - 1) 3M, Model 82 A1N.
 - 4. Station box:
 - a. Lid and collar materials: Cast iron.
 - b. Lid type: Locking.
 - c. Able to withstand heavy traffic loading.
 - d. Manufacturers: One of the following or equal:
 - 1) CP Test & Valve Products, Inc., Glenn Test Station.
 - 2) Farwest Corrosion Control.
- C. Witness markers:
 - 1. Manufacturers: One of the following or equal:
 - a. Carsonite Composites, Utility Marker.
 - 2. Materials:
 - a. Glass fiber and resin reinforced thermosetting composite material.
 - b. UV resistant.
 - 3. Constructed as a single piece.
 - 4. Pointed at the bottom end.
 - 5. Information to be included on the marker:
 - a. "Caution" (type of service) "Pipeline".
 - b. Phone number for Underground Service Alert.
 - c. Phone number for Owner in case of emergency.
 - d. Station number.
 - e. Offset:
 - 1) Only provide offset if marker is not directly over the pipe.
 - f. Name of appurtenance or fitting (e.g. 45, BO, ARV, etc.)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify satisfactory conditions of substrate for applying identification.
- B. Verify that conditions are satisfactory for installation and application of products as specified in Section 01601 - Product Requirements.

3.02 PREPARATION

- A. Prepare and coat piping with the coating systems defined in the Piping Schedule.
- B. Prepare surface in accordance with identification product manufacturer's instructions.

3.03 BURIED PIPING IDENTIFICATION

- A. Underground warning tape:
 - 1. Non-detectable warning tape:
 - a. Place continuous run of warning tape in pipe trench, 12 inches above the pipe.
 - 2. Detectable warning tape:
 - a. Place continuous run of warning tape in pipe trench, 12 inches above the pipe or a greater height if necessary to limit the tape bury depth to 36 inches. Do not bury detectable warning tape deeper than 36 inches.
- B. Tracer wire:
 - 1. Install on all non-metallic pipe.
 - 2. Install an electrically continuous run of tracer wire along the entire length of the pipe with wire terminations in valve boxes, vaults, or structures.
 - 3. Install tracer wire on top of the pipe and secure to pipe with tape a minimum of every 10 feet.
 - 4. Where approved by the Engineer, splice sections of wire together using approved direct bury wire nuts.
 - a. Twisting the wires together is not acceptable.
- C. Witness markers:
 - 1. Install over pipe in unpaved open-space areas at intervals not greater than 200 feet.
 - 2. Place markers at appurtenances located in unpaved areas.
 - 3. Embed markers at least 18 inches into the soil.

END OF SECTION

SECTION 02005
PIPING SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
1. Piping specialties, including:
 - a. Flexible rubber connections.
 - b. Bellows type expansion joints.
 - c. Slip type expansion joints.
 - d. Rubber expansion joints.
 - e. Ball-type flexible joint pipe.
 - f. Vibration control joints.
 - g. Transition fittings.
 - h. Pipe couplings for stainless steel piping.
 - i. Pipe saddles.
 - j. Tapping sleeves.
 - k. Surge cushions.
 - l. Sight gauges.
 - m. Spray nozzles.
 - n. Washdown monitors.
 - o. Chemical Injector/Diffuser.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
1. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24, Metric/Inch Standard.
- B. American Water Works Association (AWWA):
1. C110 - Standard for Ductile-Iron and Gray-Iron Fittings.
 2. C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast.
- C. ASTM International (ASTM):
1. A148 - Standard Specification for Steel Castings, High-Strength, for Structural Purposes.
 2. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 3. A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 4. A536 - Standard Specification for Ductile Iron Castings.
- D. NSF International (NSF):
1. 61 - Drinking Water System Components - Health Effects, Includes Errata.
 2. 372 - Drinking Water System Components - Lead Content.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures and Section 01601 - Product Requirements.
- B. Product data:
 - 1. For each piping product in this Section as applicable:
 - a. Design features.
 - b. Load capacities.
 - c. Material designations by UNS alloy number or ASTM Specification and Grade.
 - d. Data needed to verify compliance with the Specifications.
 - e. Catalog data.
 - f. Clearly mark Submittal information to show specific items, materials, and accessories or options being furnished.
- C. Installation instructions:
 - 1. Provide manufacturer's installation instructions.
- D. Calculations:
 - 1. Provide calculations in accordance with NSF 372 for materials in contact with drinking water.
- E. Manufacturer's Certificate of Installation as specified in Section 01756 - Commissioning:
 - 1. Provide as specified in this Section.

1.04 WARRANTY

- A. As specified in Section 01783 - Warranties and Bonds.

PART 2 PRODUCTS

2.01 GENERAL

- A. As specified in Section 01601 - Product Requirements.

2.02 FLEXIBLE RUBBER CONNECTIONS

- A. Manufacturers: One of the following or equal:
 - 1. Mercer Rubber Co., Type 150 Vibraflex.
 - 2. Red Valve Co., Inc., Part Number P-5.
- B. Provide flexible rubber connections with 3/8-inch thick neoprene rubber tube with full-faced flanged ends suitable to withstand a pressure of 150 pounds per square inch gauge.
- C. Provide complete flexible rubber connections, including galvanized retaining rings and control rods.

2.03 SLIP TYPE EXPANSION JOINTS

- A. For steam cleaned piping:
 - 1. Manufacturers: One of the following or equal:
 - a. Dresser Industries, Inc., Style 63, Type 2.
 - b. Smith-Blair, Inc., Number 612 with slip pipe and without limit rods.
 - 2. Packing: Suitable for temperatures greater than 212 degrees Fahrenheit.
- B. PVC expansion joints:
 - 1. Flexible bellows type.
 - 2. Manufacturers: One of the following or equal:
 - a. Chemtrol.
 - b. NDS Flow Management, Quik-Fix.
 - 3. Materials: PVC with EPDM O-ring.
 - 4. Design:
 - a. 150 pounds per square inch pressure rating.
 - b. Double O-ring seal.
 - c. Axial travel: Not less than 1.5 inches.
 - d. Ends: 150 pound ASME flanges, or plain end suitable for solvent welding connections.

2.04 RUBBER EXPANSION JOINTS

- A. Manufacturers: One of the following or equal:
 - 1. Mercer Rubber Co., Style 500 or 700.
 - 2. Proco Products, Inc., Series 230 or 240.
 - 3. Red Valve Co., Inc., Type J-1.
- B. Provide rubber expansion joints complete with control units and split retaining rings.
- C. Design:
 - 1. Neoprene rubber, reinforced with embedded steel rings, and a strong synthetic fabric.
 - 2. Expansion rings, suitable for pressures of at least 125 pounds per square inch gauge, except as follows:
 - a. Expansion joints in pump suction piping and where indicated on the Drawings suitable for minimum 90 pounds per square inch gauge pressure, and minimum 30 inches mercury vacuum.
 - b. Ends of expansion joints: 150 pound ASME flanges with drilling to match that of the piping.
 - 3. Bolts, nuts, control rods/plates, and retaining rings shall be galvanized steel unless otherwise specified.
 - 4. Bolts, nuts, control rods/plates, and retaining rings for low pressure air systems provide materials matching the piping system.
 - 5. Bolts, nuts, control rods/plates, and retaining rings submerged in water or wastewater, buried, in wet vaults or structures, adjacent to wet walls, or above open water-containing structures shall be Type 316 stainless steel in accordance with ASTM A193, Grade B8M for bolts, and in accordance with ASTM A194, Grade 8M, for nuts.

- D. For blowers: Butyl type rubber formulated for service application and for maximum temperature of 250 degrees Fahrenheit, suitable for minimum 40 pounds per square inch gauge pressure, and minimum 15 inches mercury vacuum.

2.05 TAPPING SLEEVES

- A. Manufacturers: One of the following or equal:
 - 1. Romac Industries, Inc., Style FTS 420.
 - 2. Smith-Blair, Inc., Style 622.
- B. Materials:
 - 1. Tapping sleeves: Steel construction.
 - 2. Bolts and nuts: Type 304 stainless steel.
 - 3. Nuts: Teflon™ coated.
 - 4. Gaskets: Rubber.
 - 5. Size of tapped boss: As indicated on the Drawings.

2.06 DELIVERY, STORAGE, AND HANDLING

- A. As specified in Section 01601 - Product Requirements.

PART 3 EXECUTION

3.01 GENERAL

- A. As specified in Section 01601 - Product Requirements.
- B. Drawings supersede conflicts with this Section.
- C. Bellows type expansion joints and vibration control joints:
 - 1. Protect joints against damage during pressure test.

3.02 INSTALLATION

- A. Expansion control joints:
 - 1. Install bellows type expansion control joints at piping connections to mechanical equipment to prevent damaging stresses due to normal expansion and contraction with temperature changes in piping and connected equipment.
 - 2. Install bellows type expansion joints so as to allow 2-1/4 inch expansion per 100 linear feet of piping.
 - 3. Install expansion joints adjacent to an anchor, and provide 1 concentric guide on piping within 12 pipe diameters, but not more than 5 feet, from the end of the joint opposite the anchor.
 - a. Locate a similar guide approximately 30 diameters but not more than 10 feet from the first.
 - 4. For expansion joints not installed adjacent to an anchor provide 2 concentric guides similarly located at each end of the joint.
 - 5. Provide control rods and additional guides where indicated on the Drawings but at no greater intervals than recommended by the joint manufacturer in published instructions.

6. Space intermediate supports a minimum of 10 feet, and tack weld the protective saddles to the pipe.
- B. Expansion joints for steam cleaned piping:
1. Install no less than 1 expansion joint in a run of steam cleaned piping which exceeds 20 feet in length.
 - a. Do not exceed 200 feet in spacing of expansion joints.
 2. Install expansion joints in steam cleaned piping between anchors.
- C. Vibration control joints:
1. Install at piping connections to or from mechanical equipment to prevent transmitting equipment vibration through the piping system.
- D. Transition couplings:
1. Application:
 - a. Use with function and design similar to flexible couplings and flanged coupling adapters for connecting piping having different outside diameters.
 2. Install products specifically designed and manufactured for that application.
- E. Pipe saddles:
1. Coat threads on bolts with anti-gall coating prior to installation.
- F. Tapping sleeves:
1. Verify existing pipe material and outer diameter prior to ordering materials.
 2. Coat threads on bolts with anti-gall coating prior to installation.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer services:
1. Required only for:
 - a. Transition couplings.
 - b. Tapping sleeves for large diameter pipe.
 2. Provide Manufacturer's Certificate of Installation.
- B. Field testing:
1. As specified in Section 02001 - Common Work Results for General Piping.
 2. Protect vibration control joints.

END OF SECTION

SECTION 02009

PIPING SYSTEMS TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Test requirements for piping systems.

1.02 REFERENCES

- A. American Water Work Association (AWWA):
 - 1. C600-17 - Installation of Ductile Iron Mains and Their Appurtenances.
 - 2. C605-21 - Underground Installation of PVC and PVCO Pressure Pipe and Fittings.
- B. Underwriters Laboratories Inc. (UL).

1.03 TESTING REQUIREMENTS

- A. General requirements:
 - 1. Testing requirements are stipulated in laws and regulations, specified in the Pipe Schedule in Section 02001 - Common Work Results for General Piping, specified in the Specifications covering the various types of piping, and are specified in this Section.
 - 2. Requirements in laws and regulations supersede other requirements of the Contract Documents, except where requirements of the Contract Documents are more stringent, including higher test pressures, longer test times, and lower leakage allowances.
 - 3. Test plumbing piping in accordance with laws and regulations, the plumbing code, as specified in Section 01410 - Regulatory Requirements, and UL requirements.
 - 4. When testing with water, the specified test pressure is considered to be the pressure at the lowest point of the piping section under test.
 - a. Lower test pressure as necessary (based on elevation) if testing is performed at a higher point of the pipe section.
- B. Furnish necessary personnel, materials, and equipment, including bulkheads, restraints, anchors, temporary connections, pumps, water, pressure gauges, and other means and facilities required to perform tests.
- C. Water for testing, cleaning, and disinfecting:
 - 1. As specified in Section 01500 - Temporary Facilities and Controls.
 - a. Use potable water for all potable waterlines.
 - b. Use potable water for all other pipes.

- D. Pipes to be tested:
 - 1. Test only those portions of pipes that have been installed as part of this Contract.
 - 2. Test new pipe sections prior to making final connections to existing piping.
 - 3. Furnish and install test plugs, bulkheads, and restraints required to isolate new pipe sections.
 - 4. Do not use existing valves as test plug or bulkhead.
- E. Unsuccessful tests:
 - 1. Correct defects or remove defective piping and appurtenances and install piping and appurtenances that comply with the specified requirements.
 - 2. Repeat testing until tests are successful.
- F. Test completion: Drain and leave piping clean after successful testing.
- G. Test water disposal:
 - 1. Dispose at lift station in accordance with requirements of federal, state, county, and city regulations governing disposal of wastes in the location of the Project and disposal site.
 - 2. Requirements and costs associated with notifications and obtaining any discharge permit or approvals shall be the responsibility of the Contractor.

1.04 SUBMITTALS

- A. Furnish Submittals as specified in Section 01330 - Submittal Procedures.
- B. Schedule and notification of tests:
 - 1. Submit a list of scheduled piping tests by noon of the working day preceding the date of the scheduled tests.
 - 2. Notification of readiness to test: Immediately before testing, notify the Engineer in writing of readiness, not just intention, to test piping.
 - 3. Have personnel, materials, and equipment specified in place before submitting notification of readiness.
- C. Pipe system test report:
 - 1. Submit a report for all piping tested. At a minimum, the test report shall include the following information:
 - a. Description of piping being tested:
 - 1) Pipe material.
 - 2) Section of piping being tested:
 - a) Date and time of pipe test.
 - b) Name of person performing the pipe test.
 - c) Specified test method and testing requirements (low-head, high-head, test pressure, test duration, etc.).
 - d) Initial test pressure and time of pressure.
 - e) Final test pressure and time of pressure.
 - f) Status of test: Pass or fail.
 - g) Signature of the Contractor and Owner's representative that witnessed the pipe test.

1.05 SEQUENCE

- A. Clean piping before pressure or leak tests.
- B. Test gravity piping underground, including sanitary sewers, for visible leaks before backfilling and compacting.
- C. Underground pressure piping may be tested before or after backfilling when not indicated or specified otherwise.
- D. Backfill and compact trench or provide blocking that prevents pipe movement before testing underground piping with a maximum leakage allowance.
- E. Test underground piping before encasing piping in concrete or covering piping with slab, structure, or permanent improvement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TESTING ALIGNMENT, GRADE, AND DEFLECTION

- A. Alignment and grade:
 - 1. Visually inspect the interior of gravity piping with artificial light, reflected light, or laser beam.
 - 2. Consider inspection complete when no broken or collapsed piping, no open or poorly made joints, no grade changes that affect the piping capacity, or no other defects are observed.
- B. Deflection test:
 - 1. Pull a mandrel through the clean piping section under test.
 - 2. Perform the test not sooner than 30 days after installation and not later than 60 days after installation.
 - 3. Use a 9-rod mandrel with a contact length of not less than the nominal diameter of the pipe within 1 percent plus or minus.
 - 4. Consider test complete when the mandrel can be pulled through the piping with reasonable effort by 1 person, without the aid of mechanical equipment.

3.02 TESTING GRAVITY FLOW PIPING

- A. Test gravity flow piping, indicated with "GR" in the Pipe Schedule, as follows:
 - 1. Unless specified otherwise, subject gravity flow piping to the following tests:
 - a. Alignment and grade.
 - b. For plastic piping test for deflection.
 - c. Visible leaks and pressure with maximum leakage allowance, except for storm drains and culverts.
 - 2. Inspect piping for visible leaks before backfilling.
 - 3. Provide temporary restraints when needed to prevent movement of piping.
 - 4. Pressure test piping with maximum leakage allowance after backfilling.

5. With the lower end plugged, fill piping slowly with water while allowing air to escape from high points. Keep piping full under a slight head for the water at least 24 hours:
 - a. Examine piping for visible leaks. Consider examination complete when no visible leaks are observed.
 - b. Maintain piping with water or allow a new water absorption period of 24 hours for the performance of the pressure test with maximum leakage allowance.
 - c. After successful completion of the test for visible leaks and after the piping has been restrained and backfilled, subject piping to the test pressure for a minimum of 4 hours while accurately measuring the volume of water added to maintain the test pressure:
 - 1) Consider the test complete when leakage is equal to or less than the following maximum leakage allowances:
 - a) For concrete piping with rubber gasket joints: 80 gallons per day per inch of diameter per mile of piping under test:
 - (1) Advise the manufacturer of concrete piping with rubber gasket joints of more stringent than normal maximum leakage allowance.
 - b) For vitrified clay piping: 500 gallons per day per inch of diameter per mile of piping under test.
 - c) For polyvinyl chloride (PVC) gravity sewer pipe: 25 gallons per day per inch diameter per mile of piping under test.
 - d) For other piping: 80 gallons per day per inch diameter per mile of piping under test.

3.03 TESTING HIGH-HEAD PRESSURE PIPING

- A. Test piping for which the specified test pressure in the Pipe Schedule is 20 pounds per square inch gauge or greater, by the high head pressure test method, indicated with "HH" in the Pipe Schedule.
- B. General:
 1. Test connections, hydrants, valves, blowoffs, and closure pieces with the piping.
 2. Do not use installed valves for shutoff when the specified test pressure exceeds the valve's maximum allowable seat differential pressure. Provide blinds or other means to isolate test sections.
 3. Do not include valves, equipment, or piping specialties in test sections if test pressure exceeds the valve, equipment, or piping specialty safe test pressure allowed by the item's manufacturer.
 4. During the performance of the tests, test pressure shall not vary more than plus or minus 5 pounds per square inch gauge with respect to the specified test pressure.
 5. Select the limits of testing to sections of piping. Select sections that have the same piping material and test pressure.
 6. When test results indicate failure of selected sections, limit tests to piping:
 - a. Between valves.
 - b. Between a valve and the end of the piping.
 - c. Less than 500 feet long.
 7. Test piping for a minimum of 2 hours for visible leaks test and a minimum of 2 hours for the pressure test with maximum leakage allowance.

- C. Testing procedures:
1. Fill piping section under test slowly with water while venting air.
 2. Before pressurizing for the tests, retain water in piping under slight pressure for a water absorption period of a minimum of 24 hours.
 3. Raise pressure to the specified test pressure and inspect piping visually for leaks:
 - a. Consider visible leakage testing complete when no visible leaks are observed.
- D. Pressure test with maximum leakage allowance:
1. Leakage allowance is zero for piping systems using flanged, National Pipe Thread threaded and welded joints.
 2. Pressure test piping after completion of visible leaks test.
 3. For piping systems using joint designs other than flanged, threaded, or welded joints, accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period:
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the pressure test with maximum leakage allowance shall be achieved when the observed leakage during the test period is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - c. When leakage is allowed, calculate the allowable leakage in accordance with AWWA C605-21 or AWWA C600-17 by using the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

wherein the terms shall mean:

L = Allowable leakage in gallons per hour.

S = Length of the test section in feet.

D = Nominal diameter of the piping in inches.

P = Average observed test pressure in pounds per square inch gauge, at the lowest point of the test section, corrected for elevation of the pressure gauge.

3.04 TESTING LOW-HEAD PRESSURE PIPING

- A. Test piping for which the specified test pressure is less than 20 pounds per square inch gauge, by the low head pressure test method, indicated with "LH" in the Pipe Schedule.
- B. General:
1. Test pressures shall be as scheduled in Section 02001 - Common Work Results for General Piping.
 2. During the performance of the tests, test pressure shall not vary more than plus or minus 2 pounds per square inch gauge with respect to the specified test pressure.

3. Test connections, blowoffs, vents, closure pieces, and joints into structures, including existing bell rings and other appurtenances, with the piping.
 4. Test piping for a minimum of 2 hours for visible leaks test and a minimum of 2 hours for the pressure test with maximum leakage allowance.
- C. Visible leaks test:
1. Subject piping under test to specified pressure measured at the lowest end.
 2. Fill piping section under test slowly with water while venting air:
 - a. Use potable water for all potable waterlines and where noted on the Pipe Schedule.
 3. Before pressurizing for the tests, retain water in piping under slight pressure for the water absorption period of a minimum of 24 hours.
 4. Raise pressure to the specified test pressure and inspect piping visually for leaks. Consider testing complete when no visible leaks are observed.
- D. Pressure test with maximum leakage allowance:
1. Pressure test piping after completion of visible leaks test.
 2. Accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period:
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage of 80 gallons per inch of nominal diameter, per mile of piping section under test after 24 hours, and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the leakage test shall have been achieved when the observed leakage is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.
- E. Optional joint test:
1. When joint testing is allowed by note in the Pipe Schedule, the procedure shall be as follows:
 - a. Allowed only for low head pressure piping.
 - b. Does not replace and is not in lieu of any testing of the piping system or trust restraints.
 2. May be performed with water or air.
 3. Joint test piping after completion of backfill and compaction to the top of the trench.
 4. Joint testing with water:
 - a. Measure test pressure at the invert of the pipe. Apply pressure of 4 feet plus the inside diameter of the pipe in water column within 0.20 feet in water column.
 - b. Maintain test pressure for 1 minute.
 - c. Base the allowable leakage per joint on 80 gallons per inch nominal diameter, per mile of piping, per 24 hours equally distributed to the actual number of joints per mile for the type of piping.
 - d. Consider the pressure test to be complete when makeup water added is less than the allowable leakage.
 - e. Successful completion of the joint test with water shall have been achieved when the observed leakage is equal or less than the allowable leakage.

5. Joint testing with air:
 - a. Apply test pressure of 3 pounds per square inch gauge with a maximum variation of plus 0.20 and minus 0.00 pounds per square inch.
 - b. Maintain test pressure for 2 minutes.
 - c. Consider the pressure test to be complete when the test pressure does not drop below 2.7 pounds per square inch for the duration of the test.

END OF SECTION

SECTION 02050

SOILS AND AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Material requirements for soils and aggregates.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. C117 - Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - 2. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - 3. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 4. D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - 5. D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - 6. D4829 - Standard Test Method for Expansion Index of Soils.
- B. Utah Department of Transportation (UDOT):
 - 1. Standard Specifications for Road and Bridge Construction (Standard Specifications).
- C. American Public Works Association (APWA)
 - 1. Utah Manual of Standard Specifications.

1.03 SUBMITTALS

- A. Product data:
 - 1. Material source.
 - 2. Gradation.
 - 3. Testing data.
- B. Quality control for aggregate base course:
 - 1. Test reports: As required by Sections of Standard Specifications.
 - 2. Certificates of compliance: As required by Sections of Standard Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection: Protect from segregation and excessive moisture during delivery, storage, and handling.
- B. Comply with Standard Specifications storage requirements, if applicable.

PART 2 PRODUCTS

2.01 MATERIALS - GENERAL

- A. Provide material having maximum particle size not exceeding 4 inches and that is free of trash, lumber, debris, leaves, grass, roots, stumps, and other organic matter.
- B. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
- C. Comply with soil and aggregate material requirements in the Standard Specifications, unless specified otherwise.

2.02 NATIVE MATERIAL

- A. Native soil:
 - 1. The Native on-site soils are not to be used for backfill under or around structures or in pipe bedding. See drawings for backfill requirements under and around structures. Unless noted otherwise on the drawings, they may be considered or used as general site fill or site grading if the organics and other deleterious materials are removed.
 - 2. Materials containing debris, organics or other deleterious materials are not recommended for use below or surrounding the proposed structures or below areas of proposed surface improvements or pipes but may be considered for use in landscaping or other unimproved areas of the site.

2.03 AGGREGATE BASE COURSE

- A. Material requirements:
 - 1. Crushed gravel as specified in the Utah Manual of Standard Specifications.
 - 2. Untreated base course.
 - 3. Consists of hard durable particles or fragments of stone or gravel; screened or crushed to required size and grading; and free from organic matter, contamination from chemical or petroleum products, or other deleterious matter.
 - 4. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
 - 5. Aggregate base course for structures:
 - a. Consists of crushed or fragmented particles.
 - 6. When sampled and tested in accordance with specified test methods, material shall comply with the following requirements:
 - a. Percentage of wear: Not to exceed 50 percent after 500 revolutions when tested in accordance with AASHTO TP 95.
 - b. Plasticity index: Shall not be more than 6 when tested in accordance with AASHTO T 90.

- c. Conforms to size and grade within the following limits when tested in accordance with AASHTO T 11 and AASHTO T 27:

Sieve Sizes (Square Openings)	Percent by Weight Passing Sieve	Job Mix Gradation Tolerance
1 1/2 inch	100	
1 inch	90 - 100	±9.0
3/4 inch	70 - 85	±9.0
1/2 inch	65 - 80	±9.0
3/8 inch	55 - 75	±9.0
No. 4	40 - 65	±7.0
No. 16	25 - 40	±5.0
No. 200	7 - 11	±3.0

2.04 GRAVEL

- A. Material requirements:
1. Consists of hard, durable particles or fragments of stone or gravel; screened or crushed to specified sizes and gradations; and free from organic matter, lumps or balls of clay, alkali, adobe, or other deleterious matter.
 2. When sampled and tested in accordance with specified test methods, material shall comply with following requirements:
 - a. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
 - b. Plasticity index: Not greater than 5 when tested in accordance with ASTM D4318.
 - c. Liquid limit: Not greater than 25 percent when tested in accordance with ASTM D4318.
 3. Conforms to sizes and grade within the following limits when tested in accordance with ASTM C117 and C136:

Sieve Size (Square Openings)	Percent By Weight Passing Sieve	
	Type A	Type B
3 inch	100	--
1-1/2 inch	--	100
Number 4	30 - 75	30 - 70
Number 8	20 - 60	20 - 60
Number 30	10 - 40	10 - 40

2.05 DRAIN ROCK

- A. Material requirements:
1. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.

2. Consists of hard, durable particles of stone or gravel; screened or crushed to specified size and gradation; and free from organic matter, lumps or balls of clay, or other deleterious matter.
3. Crush or waste coarse material and waste fine material as required to meet gradation requirements.
4. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
2 inch	100
1-1/2 inch	95 - 100
3/4 inch	50 - 100
3/8 inch	15 - 55
No. 200	0 - 2

2.06 CLASS 2 PERMEABLE FILL

- A. Material requirements:
1. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
 2. Consists of hard, durable particles or fragments of stone or gravel; crushed to required size and grading; and free from organic matter, lumps or balls of clay, alkali, adobe, or other deleterious matter.
 3. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
 4. Aggregate base course for structures:
 - a. Consist of crushed or fragmented particles.
 5. When sampled and tested in accordance with specified test methods, material shall comply with the following requirements:
 - a. Sand equivalent: Not less than 75 when tested in accordance with ASTM D2419.
 6. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
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

2.07 STRUCTURAL FILL

- A. All structures are to have a minimum of 5 feet of structural fill placed against the walls during backfill. See drawings for more information.
- B. Material Requirements:
1. Imported materials composed of crushed or processed gravel.
 2. Consists of hard, angular, durable particles of stone or gravel; screened or crushed to the specified size and gradation; and free from organic matter, lumps or balls of clay, and other deleterious matter.
 3. When sampled and tested in accordance with specified test methods, material shall comply with the following requirements:
 - a. Percentage of wear: Not to exceed 40 percent after 500 revolutions when tested in accordance with ASTM C 131.
 - b. Plasticity index: Not be more than 5 when tested in accordance with ASTM D4318.
 4. Well graded materials with a coefficient of uniformity greater than 4 and a coefficient of curvature between 1 and 3 inclusively. See ASTM D 2487.
 5. Conforms to size and grade within the following limits when tested in accordance with ASTM C 117 and C 136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
2 inches	100
1-1/2 inches	90 - 100
1 inch	80 - 92
3/4 inch	70 - 85
3/8 inch	55 - 75
No. 4	40 - 65
No. 16	24 - 40
No. 200	7 - 11

2.08 SAND

- A. Clean, coarse, natural sand.
- B. Non-plastic when tested in accordance with ASTM D4318.
- C. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
1/2 inch	100
No. 200	0 - 20

2.09 STABILIZATION MATERIAL

- A. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
- B. Durability: Percentage of wear not greater than 40 percent when tested in accordance with California Test 211.
- C. Consists of clean, hard, durable particles of crushed rock or gravel; screened or crushed to the specified sizes and gradations; and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance.
- D. Shall be free of slaking or decomposition under the action of alternate wetting and drying.
- E. The portion of material retained on the 3/8-inch sieve shall contain at least 50 percent of particles having 3 or more fractured faces.
 - 1. Not over 5 percent shall be pieces that show no such faces resulting from crushing. Of that portion which passes the 3/8-inch sieve but is retained on the No. 4 sieve, not more than 10 percent shall be pieces that show no faces resulting from crushing.
- F. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90 - 100
No. 4	0 - 10
No. 200	0 - 2

2.10 SOURCE QUALITY CONTROL (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02200

SITE CLEARING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Clearing, grubbing, and stripping project site.

1.02 REFERENCES

- A. United States Code of Federal Regulations (CFR):
 - 1. 40 - Protection of Environment.
 - a. 503 - Standards for the Use or Disposal of Sewage Sludge.

1.03 DEFINITIONS

- A. Clearing: Consists of removal of natural obstructions and existing foundations, buildings, fences, lumber, walls, stumps, brush, weeds, rubbish, trees, boulders, utility lines, and any other items which interferes with construction operations or are designated for removal.
- B. Grubbing: Consists of the removal and disposal of wood or root matter below the ground surface remaining after clearing and includes stumps, trunks, roots, or root systems greater than 1 inch in diameter or thickness to a depth of 6 inches below the ground surface.
- C. Stripping: Includes the removal and disposal of all organic sod, topsoil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped. The depth of stripping is estimated to be 6 inches, but the required depth of stripping will be determined by the Engineer.

1.04 QUALITY ASSURANCE

- A. Regulatory requirements: Verify and comply with applicable regulations regarding those governing noise, dust, nuisance, drainage and runoff, fire protection, and disposal.
- B. Pre-construction conference: Meet with Engineer to discuss order and method of work.

1.05 SEQUENCING AND SCHEDULING

- A. Clearing and grubbing: Perform clearing and grubbing in advance of grading operations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine site and verify existing conditions for beginning work.

3.02 PREPARATION

- A. Protect existing improvements from damage by site preparation work.

3.03 INSTALLATION

- A. Clearing:
 - 1. Clear areas where construction is to be performed and other areas as indicated on the Drawings, or specified in this Section, of fences, lumber, walls, stumps, brush, roots, weeds, trees, shrubs, rubbish, and other objectionable material of any kind which, if left in place, would interfere with proper performance or completion of the work, would impair its subsequent use, or form obstructions.
 - 2. Do not incorporate organic material from clearing and grubbing operations in fills and backfills.
 - 3. Contractor's temporary construction facilities: Fill or remove pits, fill, and other earthwork required for erection of facilities, upon completion of the work, and level to meet existing contours of adjacent ground.
- B. Grubbing:
 - 1. From excavated areas: Grub stumps, roots, and other obstructions 3 inches or over in diameter to depth of not less than 18 inches below finish grade.
 - 2. In embankment areas or other areas to be cleared outside construction area: Do not leave stumps, roots, and other obstructions higher than the following requirements:

Height of Embankment over Stump	Depth of Clearing and Grubbing
0 feet to 2 feet	Grub stumps or roots 3 inches or over in diameter to 18 inches below original grade. Cut others flush with ground.
2 feet to 3 feet	Grub stumps 1 foot and over in diameter to 18 inches below original grade. Cut others flush with ground.
Over 3 feet	Leave no stumps higher than stump top diameter, and in no case more than 18 inches.

- 3. Backfill and compact cavities left below subgrade elevation by removal of stumps or roots to density of adjacent undisturbed soil.

- C. Stripping:
1. Remove soil material containing sod, grass, or other vegetation to depth of 6 inches from areas to receive fill or pavement and from area within 5 feet outside foundation walls.
 2. Deposit stripped material in accordance with following requirements:
 - a. At locations acceptable to Engineer.
 - b. Use accepted material in top 6 inches of areas to be used for future planting.
 3. Replace topsoil where grass, vegetation, or reseeded will be replaced as part of construction impacts.

END OF SECTION

SECTION 02241

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements to dewater trench excavations.

1.02 REFERENCES

- A. National Electrical Manufacturers Association (NEMA):
 - 1. 250 - Enclosures for Electrical Equipment (1,000 V Maximum).

1.03 COORDINATION REQUIREMENTS

- A. Coordinate the dewatering system design with excavation and shoring design.
- B. Excavation and shoring design shall consider changes in groundwater conditions and associated earth pressures in compliance with project geotechnical report requirements.
- C. Do not place concrete or masonry foundations or concrete slabs in water. Do not allow water to rise over these elements until concrete or mortar has set for at least 24 hours.
 - 1. Maintain operation of dewatering system:
 - a. Until complete structure has been constructed, including walls, slabs, beams, struts, and other structural elements.
 - b. Concrete has attained its specified compressive strength.
 - c. Backfill has been completed to 3 feet above normal static groundwater level at the site.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures and Section 01601 - Product Requirements.
- B. Dewatering plan.
- C. Copies of correspondence with the authorities having jurisdiction, regarding dewatering operations, including, but not limited to, the authorization to drill, well driller's license, well driller's permits, and completion report.
- D. Well construction logs: Include the following at a minimum:
 - 1. Descriptions of actual materials encountered, categorized in accordance with the Unified Soil Classification System.
 - 2. Construction details.
 - 3. Well development procedures and results.

4. Deviations from original design.
- E. Submit a drainage encroachment permit.
- F. Submit a settlement monitoring plan.
- G. Qualifications:
 1. Dewatering Contractor.
 2. Dewatering design Engineer.
 - a. Civil Engineer, licensed in state where the project is located.
 - b. Minimum experience: 8 years of experience in designing similar systems of equal type, size, and complexity to that required for the Work.
 3. Testing laboratory.
- H. Flowmeter:
 1. Product information on flowmeter and chart recorder.
 2. Recent flowmeter calibration documentation.
 3. Flowmeter chart recorder.

1.05 CONTROLS

- A. Dewatering shall be performed at the discretion of the Contractor as approved by the Engineer.
- B. Demonstrate the system proposed and verify that adequate equipment, personnel, and materials are provided to dewater the excavations.
- C. Discharge water without damaging adjacent property, and in conformance with discharge permit and regulations, including meeting discharge limitation parameters.
 1. Any penalties and fees due to non-conformance with permit shall be the responsibility of the Contractor.
- D. Control the rate and effect of the dewatering in such a manner as to avoid objectionable settlement and subsidence, defined shows settlement or damage that resulted from the dewatering.
 1. Engineer has determined 1 inch as the maximum amount of settlement moving upward or downward at any monitoring point in comparison to the elevations taken during the baseline survey.
 2. Operating wells for active dewatering shall not exceed a distance of 2,000 linear feet at a single trenching run and the discharge water volume must be within the terms of the discharge permit.
 - a. Simultaneous dewatering at different trenching runs will be performed under the same discharge permit and the cumulative discharge water volume is subject to the terms of the permit.
 3. Operating wells for active dewatering shall not exceed 90 days of continuous operation at a single trenching run.
 - a. At a time not longer than 80 days after the beginning of dewatering operations at a trenching run, if the Contractor believes that construction cannot be completed within the specified 90-day limit, the Contractor shall notify the Engineer immediately.

- b. At that time, a meeting between the Contractor and the Engineer shall be scheduled to review settlement monitoring surveys and to discuss options in order to prevent damage to existing structures.
 - 4. If survey monitoring during dewatering activities reveals settlement upward or downward of any monitoring point has reached 90 percent of this maximum settlement value, the Contractor shall notify the Engineer immediately.
 - a. At that time, a meeting between the Contractor and the Engineer shall be scheduled to review settlement monitoring surveys and to discuss options in order to prevent damage to existing structures.
- E. Contractor shall be responsible for ensuring dewatering operations shall be adequate to ensure the integrity of the finished project.

1.06 SETTLEMENT

- A. Establish reference points by a Professional Land Surveyor where critical structures or facilities exist immediately adjacent to areas of proposed dewatering.
- B. Observe reference points at daily intervals by a Professional Land Surveyor to detect settlement.
- C. Implement a settlement monitoring plan. The plan shall include, but not be limited to, the following:
 - 1. Install settlement monitoring points along those existing structures within the influence zone of the dewatering wells. The location and number of monitoring points including the method of establishing the points shall be approved by the Engineer prior to their installation.
 - 2. Utilize a land surveyor licensed in the State of Utah, to perform settlement monitoring surveys. Surveyor shall select a benchmark or control point to perform settlement surveys suitable to the Engineer that is outside of the influence zone of the dewatering system.
 - 3. Establish settlement monitoring points at maximum 200-foot intervals along the existing right-of-way on both sides of the construction areas for open cut pipelines.
 - 4. Establish settlement monitoring points at maximum 50-foot intervals along the existing right-of-way on both sides of the construction areas for tunneled pipelines; and 6 monitoring points by each launching or receiving shaft, 2 points on either side of shaft, 2 points on curb each side of roadway at the prescribed intervals for tunneling.
 - a. Additional monitoring points to be identified by the Engineer, may be required at locations of critical structures.
 - b. The settlement monitoring plan and the monitoring points shall be approved by the Engineer and installed prior to the initial start-up of the dewatering system.
 - 5. Contractor/Owner shall perform a baseline survey of monitoring points prior to the start-up of the dewatering system and then perform a survey once weekly within the areas of active dewatering. A final survey shall also be performed at least 60 days after the decommissioning of the dewatering system.

6. Furnish a report of the settlement monitoring elevations with cumulative elevation differences to the Engineer within 24 hours of the survey being performed.
 - a. Furnish a final report including the results of all surveys at the end of the settlement monitoring period.
 - b. Notify the Engineer of the settlement monitoring schedule at least 7 days prior to the final settlement monitoring survey performed.

- D. Install monitoring wells to monitor the groundwater level:
 1. Provide at least 1 groundwater level monitoring well. If more than 4 dewatering wells or well points are installed, provide 1 additional monitoring well for every 4 dewatering wells or well points.
 2. Locate monitoring wells within 6 feet of excavation and midway between dewatering wells or well points.
 3. Provide temporary threaded cap, not less than 2 inches in diameter at the top of wells.
 4. Protect dewatering wells in place during excavation.

1.07 DEWATERING WELLS

- A. Design the well casing, screen slot size, and gravel filter pack according to applicable laws and regulations.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Design the dewatering system to keep excavations reasonably free from water. Draw down static groundwater level to minimum of 3 feet below anticipated bottom of excavations before the excavation reaches bottom elevation.

- B. Dewatering design and analysis. Include the following:
 1. Evaluation of anticipated subsurface conditions.
 2. Required well spacing.
 3. Diameter of wells.
 4. Drilling method and development technique.
 5. Depth to screen, screen height, and mesh size.
 6. Backfill and filter pack.
 7. Pump size.
 8. Drawdown curves.
 9. Drawdown duration.
 10. Drawdown and steady state flow rates.
 11. Plans for treatment of groundwater treatment.
 12. Plans for de-silting of groundwater before discharge.
 13. Anticipated area influenced by dewatering system and potential impacts to adjacent structures, existing and proposed.
 - a. Mitigation measures needed to prevent any expected settlements.
 - b. Contingency plan for restoring nearby structures if settlement is observed as result of dewatering operations.
 14. Expected settlement calculations.

- C. Include water drawdown curves in dewatering calculations.
- D. Provide dewatering design sealed by a registered Professional Engineer, licensed in the project location.

2.02 DESIGN CRITERIA

- A. Prior to excavation, submit a detailed dewatering plan and operation schedule for dewatering of excavations.
- B. Create a settlement monitoring plan and submitted to the Engineer for approval.
- C. Design the dewatering system to keep excavations reasonably free from water.
 - 1. Select appropriate method to dewater, subject to Engineer's review and concurrence.
 - 2. Shored excavation dewatering as specified in Section 02318 - Trenching.
 - 3. Draw down static groundwater level to minimum of 3 feet below anticipated bottom of excavations before the excavation reaches bottom elevation.
 - 4. Dewatering analysis shall determine the following:
 - a. Evaluation of anticipated subsurface conditions.
 - b. Required well spacing.
 - c. Diameter of wells.
 - d. Depth to screen, screen height, and mesh size.
 - e. Backfill and filter pack.
 - f. Pump size.
 - g. Drawdown curves.
 - h. Drawdown duration.
 - i. Drawdown and steady state flow rates.
 - j. Plans for treatment of groundwater treatment.
 - k. Settlement calculations.
 - 5. Prevent unstable excavation due to pumping and heave.
 - 6. Dewatering plan prepared by a professional Engineer licensed in the state where the project is located.
 - 7. Dewatering plan shall include, but not be limited to, the following:
 - a. Dewatering design analysis and supporting calculations.
 - b. Required permits.
 - c. Arrangement, location, and depths of dewatering system components including monitoring wells.
 - d. Type of proposed pumps to be used and their locations.
 - e. Header piping size, material, and piping alignments.
 - f. Meter type and locations.
 - g. Valve type and locations.
 - h. Piezometer locations.
 - i. Well casing and well screen materials.
 - j. Gravel filter pack materials.
 - k. Proposed discharge locations, as identified in this Section.
 - l. Settling tanks and filters.
 - m. Pipeline material, alignment, and connection details.
 - n. Materials added to borehole during drilling and construction of wells.
 - o. Sample and sieve analysis of well materials.

- p. Settlement monitoring plan for existing above and underground structures adjacent to the dewatering system.
 - q. Standby pumping equipment.
 - r. Required power supply equipment.
 - s. Design of any needed water treatment facilities shall comply with the NPDES discharge permit.
- D. Locate dewatering facilities where they will not interfere with utilities and construction work.
 - E. Design and install a water treatment system if necessary to comply with discharge limitation parameters.
 - F. Decommissioning:
 - 1. Obtain Engineer's approval to begin decommissioning activities.
 - 2. Decommission and remove dewatering system.
 - 3. Abandon existing monitoring wells located along the alignment.

2.03 EQUIPMENT

- A. Provide and maintain equipment necessary for dewatering.
- B. Keep standby equipment available at all times to ensure efficient dewatering and maintenance of dewatering operation during power failure.

2.04 DEWATERING PUMPS

- A. Preliminary well type and location are as indicated on the Drawings.
- B. Specifically designed for dewatering applications where pumping sand may be encountered.
 - 1. Impeller and rotor shaft shall be hardened, heat-treated stainless steel. Mechanical seal material shall be silicon carbide.
 - 2. Pump motor shall have thermal overload protection.

PART 3 EXECUTION

3.01 DEWATERING PROCEDURES

- A. Designer of the dewatering system shall oversee dewatering operations.
- B. Site grading shall promote drainage. Surface runoff shall be diverted away from excavations.
- C. Complete dewatering prior to excavation.
 - 1. Ensure that the subsurface soil is not being removed by the dewatering operation.
- D. Continue dewatering operations throughout construction to achieve the following:
 - 1. Maintain the groundwater level a minimum of 3 feet below bottom of excavation.

2. Preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- E. Make provisions to maintain continuous dewatering.
1. Provide standby power to maintain dewatering during power outages and interruptions.
 2. Provide 24-hour monitoring by personnel skilled in operation and maintenance of the system, and capable of providing or obtaining work required to maintain system operation.
- F. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, excavate the affected areas and replaced with drain rock at no additional cost to Owner.
- G. Maintain a trench bottom free from standing water.
- H. Prevent flotation by maintaining a positive and continuous removal of water.
- I. Contractor shall be fully responsible and liable for damages that may result from failure to adequately keep excavations dewatered.
- J. Do not place concrete or masonry foundations or concrete slabs in water.
1. Do not allow water to rise over these elements until concrete or mortar has set for at least 24 hours.
- K. Maintain operation of dewatering system until the pipeline has been installed and backfill has been completed to 3 feet above normal static groundwater level at the site.
- L. Wells, well points, and drain lines for dewatering:
1. Obtain Engineer's written acceptance prior to commencing operations.
 2. Fill dewatering wells, pipes, and French drains to be left in place within structure foundation limits with Class "C" concrete as specified in Section 03301 - Concrete Work.

3.02 SETTLEMENT AND GROUNDWATER LEVEL MONITORING

- A. Conduct dewatering operation in a manner that will protect adjacent structures and facilities.
- B. Repair damage to adjacent structures and restore facilities at no expense to Owner.

3.03 WATER DISPOSAL

- A. Discharge water to the river in accordance with the permits.
- B. Dispose of water from the Work in suitable manner:
1. Without damage to adjacent property.
 2. That will not be a menace to public health or safety.

- C. Do not drain dewatering water or associated debris into the Work built or under construction.
 - 1. Under no conditions shall water or associated debris from dewatering operations be allowed to enter into any sanitary sewer system.
- D. For discharge of water into holding tanks or infiltration ponds, include a means of overflow protection that is acceptable to the Engineer.

3.04 FIELD QUALITY CONTROL

- A. Monitoring wells:
 - 1. Record groundwater levels at least once a week. Submit readings to Engineer within 1 week.
- B. Infiltration pond:
 - 1. Perform percolation testing in the area of any proposed infiltration pond.
 - 2. Submit percolation test results with the dewatering plan.

END OF SECTION

SECTION 02260

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Designing, providing, maintaining, and removing excavation support and protection.

1.02 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
- B. Department of the Navy Naval Facilities Engineering Command (NAVFAC):
 - 1. Design Manual 7.2 - Foundations and Earth Structures.
 - 2. Design Manual 7.3 - Soil Dynamics and Special Design Aspects.
- C. United States Steel Corporation (USS):
 - 1. Steel Sheet Piling Design Manual.

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
 - 1. General engineering design practice: In area of the Project, performed in accordance with recent engineering literature on subject of shoring and stability of excavations.
 - 2. Shoring: A temporary structural system designed to support vertical faces, or nearly vertical faces, of soil or rock for purposes of excavation. Shoring includes internally braced sheet piling, slurry walls, soldier piles and lagging and other similar shoring systems. Sloping of the soil is not shoring.
 - 3. Support levels: Level of tiebacks, wales, rakers, bottom of excavation, and other types of support.

1.04 SUBMITTALS

- A. Shop Drawings and calculations:
 - 1. Calculations for different load, support, and other conditions that occur during the sequence of installation of shoring, construction of facilities protected by shoring, and sequence of removal of shoring.
 - 2. Sketches showing the condition at various stages of installation and removal of shoring.
 - 3. Show on plan shoring, structures, pipelines, and other improvements located near shoring.

4. When utilities penetrate shoring, show location of penetrations on elevation of sides of shoring.
 5. Show details for ground support and sealing around utility penetrations.
 6. Indicate method used for installing driven shoring.
- B. Control points and schedule of measurements:
1. Submit location and details of control points and method and schedule of measurements.
 2. Survey data.
- C. Detailed sequence of installation and removal of shoring:
1. Consider effects of ground settlement in sequence of installation and removal of shoring.
 2. Provide sketches showing conditions at various stages in sequence of installation and removal of shoring.
- D. Furnish Submittals for excavation support and protection as complete package and include items required in this Section:
1. Incomplete Submittals will not be reviewed and will be returned for resubmittal as a complete package.
- E. Furnish dewatering Submittals as specified in Section 02241 - Dewatering with Submittals for excavation support and protection.

1.05 SEQUENCING

- A. Do not begin construction of any shoring or excavation operations until:
1. Submittals for shoring and dewatering have been accepted.
 2. Materials necessary for installation are on site.
- B. Furnish Submittals a minimum of 15 days prior to scheduled date to begin excavation work.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Where general engineering design practice is specified, provide Drawings and calculations that are performed and signed by civil or structural engineer registered in the state where the Project is located:
1. Clearly disclose assumptions made, criteria followed, and stress values used for materials being used in design calculations.
 2. Submit list of references acceptable to the Engineer that substantiate appropriateness of design assumptions, criteria, and stress values.
- B. Design requirements:
1. General:
 - a. For trench excavations 5 feet or more in depth and for trenches less than 5 feet in depth when there is potential for cave-in.
 - 1) Perform design pursuant to general engineering design practice.

- b. Dewatering:
 - 1) Dewater soil inside shoring as specified in Section 02241 - Dewatering.
 - 2) Do not lower groundwater outside of shoring more than 3 feet.
 - 3) Recharge groundwater outside shoring to limit groundwater draw down outside of shoring to amount specified above.
 - c. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in building code as specified in Section 01410 - Regulatory Requirements, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.
 - d. Minimum safety factor used for design shall not be less than 1.5.
 - e. Calculated minimum depth of penetration of shoring below bottom of excavation shall be increased not less than 30 percent if full value of allowable passive pressure is used in design.
 - f. Location of point of fixity for shoring shall not be less than half calculated minimum embedment depth below bottom of excavation.
 - g. Generally acceptable references for design of shoring and excavations are as follows:
 - 1) ASCE Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
 - 2) NAVFAC Design Manual 7.2.
 - 3) NAVFAC Design Manual 7.3.
 - 4) USS Steel Sheet Piling Design Manual.
 - h. Maximum total deflection of shoring at any point on shoring shall not be more than 1/2 inch.
- C. Performance requirements:
- 1. General:
 - a. Support faces of excavations and protect structures and improvements in vicinity of excavations from damage and loss of function due to settlement or movement of soils, alterations in ground water level caused by such excavations, and related operations.
 - b. Specified provisions:
 - 1) Complement, but do not substitute or diminish, obligations of the Contractor for furnishing of safe place of work pursuant to provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and regulations and for protection of work, structures, and other improvements.
 - 2) Represent minimum requirement for:
 - a) Number and types of means needed to maintain soil stability.
 - b) Strength of such required means.
 - c) Methods and frequency of maintenance and observation of means used for maintaining soil stability.
 - 2. Provide safe and stable excavations by means of sheeting, shoring, bracing, sloping, and other means and procedures, such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain stability of soils and rock.
 - 3. Provide support for trench excavations for protection of workers from hazard of caving ground.

4. Provide shoring:
 - a. Where, as result of excavation work and analysis performed pursuant to general engineering design practice, as defined in this Section:
 - 1) Excavated face or surrounding soil mass may be subject to slides, caving, or other types of failures.
 - 2) Stability and integrity of structures and other improvements may be compromised by settlement or movement of soils, or changes in soil load on structures and other improvements.
 - b. For trenches 5 feet and deeper.
 - c. For trenches less than 5 feet in depth, when there is potential for cave-in.
 - d. Where indicated on the Drawings.
5. For safe and stable excavations, use appropriate design, construction, and maintenance procedures to minimize settlement of supported ground and to prevent damage to structures and other improvements, including:
 - a. Using stiff shoring systems.
 - b. Following appropriate construction sequence.
 - c. Using shoring system that is tight enough to prevent soil loss through the shoring.
 - d. Using shoring system that extends far enough below bottom of excavation to prevent piping, heave, or flow of soil under shoring.
 - e. Design for safety factor of not less than 1.50.
 - f. Providing surface runoff routing and discharge away from excavations.
 - g. Where dewatering inside shoring is necessary, recharge groundwater outside shoring as necessary to prevent settlement in area surrounding shored excavation.
 - h. Where sheet piling is used, use interlocking type sheets:
 - 1) Sheet piles shall be continuous and driven in interlock.
 - 2) If bottom of the excavation is located below the water table, use "ball and socket" or "thumb and finger" type interlock.
 - i. Not applying shoring loads to existing structures and other improvements.
 - j. Not changing existing soil loading on existing structures and other improvements.
 - k. Provide welded steel packing between soil retaining members such as sheet piles and wales and similar members when gap exceeds 1/2 inch before wales are loaded.

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Installation of shoring:
 1. Install means for providing safe and stable excavations as indicated in Submittals.
- B. Removal of shoring:
 1. Except for slurry walls, and similar shoring systems, remove shoring by completion of the Work.
 2. Select shoring system and method of removal, which will minimize soil that sticks to shoring from creating voids and causing settlement.

3. To prevent settlement caused by pulling shoring, fill voids with pressure injected grout:
 - a. Inject grout starting at bottom of void and progressively fill void to grade.
 - b. Minimize length of shoring removed ahead of grouting operation and limit time void is left ungrouted to prevent void from closing up before being grouted.
 4. Pressure preservative treated wood lagging may be left in place if acceptable to the Engineer.
- C. Control points:
1. Establish control points on shoring and on structures and other improvements in vicinity of excavation for measurement of horizontal and vertical movement:
 - a. Set control points on shoring support system:
 - 1) Set points at distances not exceeding 25 feet at each support level.
 2. Promptly upon completion of construction of control points survey control points. Submit copy of field notes with measurement.
 3. Perform horizontal and vertical survey and measurement of control points at least once every week.
 - a. Field notes shall show current measurement and change in measurement from first measurement taken.
 4. Set control points on corners of existing structures and on curbs, manholes, and other improvements at the locations indicated on the Drawings.
 5. Provide plumb bobs with horizontal targets indicating original position of plumb bobs in relation to shoring at control points.
- D. Maintenance:
1. Where loss of soil occurs, plug gap in shoring and replace lost soil with fill material acceptable to the Engineer.
 2. Where measurements and observations indicate possibility of failure or excessive movement of excavation support, determined in accordance with general engineering design practice, take appropriate action immediately.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Loosening, excavating, filling, grading, borrow, hauling, preparing subgrade, compacting in final location, wetting and drying, and operations pertaining to Site grading for buildings, basins, reservoirs, boxes, roads, and other facilities.
 - 2. Backfilling and compacting under and around structures.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specifications for Highway Bridges.
- B. ASTM International (ASTM):
 - 1. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - 2. D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
 - 1. Backfill adjacent to structure: Backfill within volume bounded by the exterior surfaces of structure, the surface of undisturbed soil in the excavation around structure, and finish grade around structure.
 - 2. Embankments: Dikes, levees, berms, and similar facilities.
 - 3. Excavation: Consists of loosening, removing, loading, transporting, depositing, and compacting in final location, wet and dry materials, necessary to be removed for purposes of construction of structures, ditches, grading, roads, and such other purposes as are indicated on the Drawings.

1.04 SUBMITTALS

- A. Copy of Property Owner's Agreement allowing placement of surplus soil material on their property.
- B. Excavation plan:
 - 1. Describe/show planned conformance with excavation limits, dimensions, depths, and other constraints put forth in the contract documents and/or Geotechnical report(s).
 - 2. Describe/show proposed shoring and excavation methods.
 - 3. Describe/show how excavation process will be sequenced and coordinated.

4. If confined site, describe/show how access will be maintained to necessary areas during excavation process.
 5. Describe/show proposed equipment and location of equipment placement, if critical to excavation stability.
- C. Testing lab: Submit the Contractor's proposed testing laboratory capabilities and equipment.
- D. Test reports:
1. Submit certified test reports of tests specified to be performed by the Contractor.
 2. Sign and seal test reports by a registered civil engineer who practices geotechnical engineering registered in Utah.

1.05 QUALITY ASSURANCE

- A. Initial compaction demonstration:
1. Adequacy of compaction equipment and procedures: Demonstrate adequacy of compaction equipment and procedures before exceeding any of following amounts of earthwork quantities:
 - a. 50 cubic yards of backfill adjacent to structures.
 - b. 100 cubic yards of embankment work.
 - c. 100 cubic yards of fill.
 - d. 50 cubic yards of roadway base material.
 - e. 100 cubic yards of road fill.
 2. Compaction sequence requirements: Until specified degree of compaction on previously specified amounts of earthwork is achieved, do not perform additional earthwork of the same kind.
 3. After satisfactory conclusion of initial compaction demonstration and at any time during construction, provide confirmation tests as specified under the Field Quality Control article.
- B. Perform Work related to this Section in accordance with the approved Stormwater Pollution Prevention Plan (SWPPP).

1.06 SEQUENCING AND SCHEDULING

- A. Schedule earthwork operations to meet requirements specified in this Section for excavation and uses of excavated material.
- B. If necessary, stockpile excavated material in order to use it at specified locations.
- C. Excavation, backfilling, and filling: Perform excavation, backfilling, and filling during construction in manner and sequence that provides drainage at all times.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Performance requirements:
 - 1. Where mud or other soft or unstable material is encountered, remove such material and refill space with stabilization material. Wrap stabilization material with stabilization fabric.
 - 2. Obtain acceptable import material from other sources if surplus obtained within the Project Site does not conform to specified requirements or are not sufficient in quantity.
 - 3. No extra compensation will be made for hauling of fill materials nor for water required for compaction.

2.02 MATERIALS

- A. Water for compacting: Use water from source acceptable to the Engineer.
- B. Soil and rock materials:
 - 1. General:
 - a. Provide aggregate base course, Class 2 permeable, controlled low-strength material, drain rock, gravel, native material, sand, structural fill, and stabilization material where specified or indicated on the Drawings.
 - b. If suitable surplus materials are available, obtain native material and select material from cut sections or excavations.
 - 2. Aggregate base course materials: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 3. Class 2 permeable: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 4. Drain rock: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 5. Gravel: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 6. Native material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 7. Sand: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 8. Structural Fill: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 9. Stabilization material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
- C. Controlled low-strength material: As specified in Section 02312 - Controlled Low Strength Materials (CLSM).
- D. Geotextile fabrics:
 - 1. Stabilization: As specified in Section 02621 - Stabilization Fabric.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions:
 - 1. Character and quantity of material:
 - a. Verify character and quantity of rock, gravel, sand, silt, water, and other inorganic or organic materials to be encountered in Work to be performed.
 - b. Determine gradation, shrinkage, and swelling of soil, and suitability of material for use intended in Work to be performed.
 - c. Determine quantity of material, and cost thereof, required for construction of backfills, cuts, embankments, excavations, fills, and roadway fills, whether from on-site excavations. Include in cost of Work to be performed.
 - d. Include wasting of excess material, if required, in the cost of Work to be performed.

3.02 PREPARATION

- A. Backfills:
 - 1. After clearing and excavation are completed, scarify entire areas that underlie backfills or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
 - 2. Recompact scarified areas to density specified before placing backfill material or concrete.
 - 3. If foundation areas have soft soils, do not scarify the top 6 inches prior to compaction.
 - a. Remove loose material using hand equipment or with a flat-edged backhoe bucket.
 - b. Do not remold and weaken the remaining soil by operating heavy equipment on final bottom elevation of excavation.
 - 4. If foundation areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.
 - 5. Do not place backfill against walls until:
 - a. Walls have been cast full height of structure and concrete has reached the specified strength.
 - b. Connecting slabs and beams have been cast, and concrete has reached the specified strength.
 - 6. Prior to backfilling:
 - a. Remove forms.
 - b. Clean trash and debris from the excavation site.
 - 7. After inspection of foundation, walls, and pipes, place backfill symmetrically around structures to prevent eccentric loading of structures.
 - 8. Place material on top of structure to prevent excessive point loading that exceeds the loading capacity of the structure.
 - a. Contractor is responsible for damage to structures due to improper backfilling and compaction.

- B. Embankments:
 - 1. After clearing is completed, scarify entire areas that underlie embankments to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
 - 2. Recompact scarified areas to density specified for embankments before placing of embankment material.
 - 3. If embankment areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.

- C. Fills:
 - 1. After clearing is completed, scarify entire areas that underlie fill sections or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
 - 2. Recompact scarified areas to density specified for compacted fills before placing of fill material or concrete.
 - 3. If fill areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.

- D. Roadway fills:
 - 1. After clearing is completed, scarify entire areas that underlie roadway fills to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
 - 2. Recompact scarified areas to density specified for roadway fills before placing of roadway fill material.
 - 3. If roadway fill areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.

- E. Sloped surfaces for fill or foundations:
 - 1. Foundations for fill having slopes in excess of 1 vertical to 4 horizontal:
 - a. Bench or terrace to adequately key existing ground and fill built thereon.
 - 2. Slopes of original hillsides and old fills: Bench minimum of 10 feet horizontally as fill is placed.
 - 3. Provision of new benches:
 - a. Start new bench wherever vertical cut of next lower bench intersects existing grade.
 - b. Recompact material thus cut out along with new embankment material at no additional cost to the Owner.

3.03 INSTALLATION

- A. General:
 - 1. Dispose of excavated materials that are not required or are unsuitable for fill and backfill in lawful manner.
 - 2. Dispose of surplus material on private property only when written permission agreement is furnished by the owner of the property. Submit copies of such agreements.
 - 3. Rocks, broken concrete, or other solid materials larger than 4 inches in greatest dimension: Remove from the Project Site at no additional cost to the Owner.

4. Stabilization of subgrade: Provide materials used, or perform Work required, to stabilize subgrade so it can withstand loads that may be placed upon it by the Contractor's equipment.
- B. Borrow area: There is no borrow area on the Project Site.
1. Where material is required, import material from source located off Project Site selected by the Contractor and subject to acceptance by the Engineer.
 2. There will be no additional cost to the Owner for use of imported material.
- C. Compaction:
1. Provide specified compaction for backfills, cuts, embankments, fills, roadway fills, and other earthwork.
 2. Perform confirmation tests to verify and confirm that Work has complied, and is complying at all times, with compaction requirements specified in this Section for initial compaction demonstration and field quality control testing.
 3. In-place density of compacted backfills, cuts, embankments, fills, and roadway fills determined in accordance with ASTM D6938.
 4. Maximum density, laboratory compaction: Soil maximum density and optimum water content when tested in accordance with ASTM D698.
 5. To prevent damage to structures due to backfilling operations, place backfill with equipment that does not exceed AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading, within a distance from the face of the structure of not less than 1/2 the depth of backfill.
 - a. Depth of backfill is the distance between the level being compacted and the bottom of the excavation. Outside this distance, heavier compaction equipment may be used.
 6. Compact to percentage of maximum density as follows:
 - a. Backfill adjacent to structures: 95 percent.
 - b. Backfilling voids: 95 percent.
 - c. Embankments: 95 percent.
 - d. Demolition areas: 95 percent.
 - e. Other areas: 85 percent.
 - f. Under present and future structures: 95 percent.
 - g. Under roadways, parking and storage areas, curbs, and sidewalks: 95 percent.
 - h. Upper 6 inches of cuts: 95 percent.
 - i. Fills: 95 percent.
- D. Dewatering: As specified in Section 02241 - Dewatering.
- E. Excavation:
1. Blasting: Not permitted.
 2. Excavations for trenching: As specified in Section 02318 - Trenching.
 3. Excavations for structures:
 - a. Provide excavations conforming to the dimensions and elevations indicated on the Drawings for each structure.
 - b. After clearing is complete, excavate for the structure, down to the elevation indicated on the Drawings. Unless directed by the Engineer, do not carry excavations below elevation indicated on the Drawings.

- c. Where soil is encountered having unsuitable bearing value, the Engineer may direct in writing that excavation be carried to elevations below those indicated on the Drawings.
 - d. Where excavations are made below elevations indicated on the Drawings, adjust elevations of excavations in accordance with the following requirements:
 - 1) Under slabs: Restore to proper elevation in accordance with procedure specified for backfill in this Section.
 - 2) Under footings: Restore to the proper elevation using one of the following:
 - a) Aggregate base course.
 - b) Controlled low-strength material.
 - e. Excavation width:
 - 1) Extend excavations at least 2 feet clear from walls and foundations of structures to allow for placing and removal of forms, installation of services, and inspection.
 - 2) Do not undercut slopes.
 - f. Difficulty of excavation: No extra compensation will be made for removal of rock or any other material due to difficulty of excavation.
- 4. Excavation of unlined channels and basins:
 - a. Excavate to lines and grades indicated on the Drawings.
 - b. Perform excavation and grading so that finish surfaces are in uniform planes with no abrupt breaks in surface.
 - 5. Necessary over excavation:
 - a. Where it becomes necessary to excavate beyond normal lines of excavation in order to remove boulders or other interfering objects, backfill voids remaining after removal as specified in backfilling of voids below, or as acceptable to the Engineer.
 - b. Backfill voids with material acceptable to the Engineer:
 - 1) With acceptance of the Engineer, backfill with one of the following:
 - a) Aggregate base course.
 - b) Controlled low-strength material.
- F. Materials for backfills, embankments, fills, and roadway fills:
- 1. General:
 - a. Obtain import material from other sources if surplus materials from cuts and excavations obtained from within the Project Site do not conform to specified requirements or are not sufficient in quantity for construction of Project.
 - 2. Backfills:
 - a. Backfill adjacent to structures, slabs, or walls: Native material or imported material meeting the requirements of native material, unless otherwise specified or indicated on the Drawings.
 - b. Backfill material under concrete structures: Aggregate base course material, except in areas where controlled low-strength material or concrete encasement are indicated on the Drawings.
 - c. Extend backfill in any area under concrete structures from undisturbed soil or rock to the bottom aggregate base course material layer.
 - 3. Embankments:
 - a. Native material or imported material meeting the requirements of native material, unless otherwise specified or indicated on the Drawings.

4. Fills:
 - a. Native material or imported material meeting the requirements of native material, unless otherwise specified or indicated on the Drawings.
 - b. Extend fill in any area under concrete structures from undisturbed soil or rock to the bottom aggregate base course material layer.
 5. Roadway fills: One of the following, unless otherwise specified or indicated on the Drawings:
 - a. Aggregate base course material.
- G. Placement:
1. General:
 - a. Lines and grades:
 - 1) Construct backfills, embankments, fills, and road fills, at locations and to lines and grades indicated on the Drawings.
 - 2) Overbuild permanent fill slopes by at least 1 foot and then cut to final grade to provide adequate compaction of the remaining fill.
 2. Backfills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 2 percent above optimum moisture content before compacting.
 - c. Defective compacted backfills: Remove and recompact.
 3. Fills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 2 percent above optimum moisture content before compacting.
 - c. Defective compacted fills: Remove and recompact.
 4. Embankments:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted embankments: Remove and recompact.
 5. Roadway fills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted roadway fills: Remove and recompact.
 6. Loose fill:
 - a. In disposal areas indicated on the Drawings, start fill at contour line indicated as finish grade:
 - 1) Continue filling of spoil area until disposal of surplus excavated material is completed.
 - 2) Slope edges of finished fill area off at between 1-1/2 and 2 horizontal to 1 vertical to natural ground.
 - 3) Provide slopes that are smooth and uniform.
 - 4) Level finish surface of disposal area to within 4 inches of elevation indicated on the Drawings.

- b. Clods or hard lumps of earth of 6 inches in greatest dimension: Break up before compacting material in embankments, except as provided as follows:
 - 1) When fill material includes large rocky material or hard lumps, such as hardpan or cemented gravel which cannot be broken readily, distribute such material throughout fill.
 - 2) Place sufficient earth or other fine material around larger material as it is deposited so as to fill interstices and produce dense, compact fill. Do not place such material within 2 feet of finish grade of fill.

3.04 FIELD QUALITY CONTROL

A. Confirmation tests:

- 1. Contractor's responsibilities:
 - a. Adequacy of compaction equipment and procedures:
 - 1) Demonstrate adequacy of compaction equipment and procedures.
 - 2) At each test location include tests for each type or class of backfill from bedding to finish grade.
 - b. Compaction sequence requirements:
 - 1) Do not perform additional earthwork of the same kind until specified degree of compaction has been demonstrated.
 - c. Cost of confirmation tests: Paid for by the Contractor.
 - d. Qualifications of the Contractor's testing laboratory: Acceptable to the Engineer.
 - e. Copies of confirmation test reports: Submit promptly to the Engineer.
- 2. Frequency of confirmation testing:
 - a. In-place density testing:
 - 1) Backfill: Minimum of 1 test per 900 square feet (or fraction thereof) per lift.
 - 2) Fill material maximum dry density versus moisture relationship testing:
 - a) For each fill material, minimum of 1 test at intervals not greater than the least of the following:
 - (1) Every 90 days;
 - (2) Every 5,000 cubic yard placed; or
 - (3) Whenever the type of characteristics of the material change.
 - b. Cost of confirmation tests:
 - 1) Paid for by the Contractor.
 - c. Qualifications of the Contractor's testing laboratory:
 - 1) Perform confirmation testing by soils testing laboratory acceptable to the Engineer. Copies of confirmation test reports: Submit promptly to the Engineer.

B. Tolerances:

- 1. Finish grading of backfills, cuts, embankments, fills, and roadway fills:
 - a. Perform fine grading under concrete structures such that finish surfaces are never above the grade or cross section indicated on the Drawings and are never more than 0.10 feet below.
 - b. Provide finish surface for areas outside of structures that are within 0.10 feet of grade or cross section indicated on the Drawings.

2. Unlined channels and basins:
 - a. In both cut and fill, and levee and access roadside slopes in cut: Vertical tolerance of none above and 3 inches below grade indicated on the Drawings on bottom and side slopes.
 - b. On top surface of levee and access road in both cut and fill, and levee and access roadside slopes in fill: Vertical tolerance of none below and 3 inches above grade indicated on the Drawings.
 3. Areas which are not under structures, concrete, asphalt, roads, pavements, sidewalks, dikes, and similar facilities:
 - a. Provide finish graded surfaces of either undisturbed soil, or cohesive material not less than 6-inches deep.
 - b. Intent of proceeding is to avoid sandy or gravelly areas.
 4. Finish grading of surfaces:
 - a. Reasonably smooth, compacted, and free from irregular surface changes.
 - b. Provide degree of finish that is ordinarily obtainable from blade grader operations, except as otherwise specified.
 - c. Uniformly grade areas that are not under concrete.
 - d. Finish ditches and gutters so that they drain readily.
- C. Compliance tests:
1. Frequency of testing: Periodic compliance tests will be made by the Engineer to verify that compaction is meeting requirements previously specified.

3.05 ADJUSTING

- A. Finish grades of excavations, backfills, and fills:
1. Repair and reestablish grades to required elevations and slopes due to any settlement or erosion that may occur from action of the elements or any other cause prior to final acceptance.

3.06 PROTECTION

- A. Finish grades of backfills, cuts, excavations, and fills:
1. Protect newly graded areas from erosion and deterioration by action of the elements.
- B. Ditches and gutters:
1. Maintain ditches and gutters free from detrimental quantities of debris that might inhibit drainage until final acceptance.

END OF SECTION

SECTION 02312

CONTROLLED LOW STRENGTH MATERIAL (CLSM)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Controlled low strength material (CLSM), also known as "flowable fill."

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 1. 229R - Report on Controlled Low-Strength Materials.
 2. 301 - Specifications for Structural Concrete.
- B. ASTM International (ASTM):
 1. C33 - Standard Specification for Concrete Aggregates.
 2. C94 - Standard Specification for Ready Mix Concrete.
 3. C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
 4. C150 - Standard Specification for Portland Cement.
 5. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 6. C494 - Standard Specification for Chemical Admixtures for Concrete.
 7. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 8. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³(600 kN-m/m³)).
 9. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).
 10. D4832 - Standard Test Method of Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 11. D5971 - Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material.
 12. D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material.

1.03 SUBMITTALS

- A. Product data: Submit data completely describing materials in the mix and demonstrating compliance with the requirements of this Section.
 1. Cement: Mill tests. Indicate alkali content representative of each shipment.
 2. Fly ash: Identify source and type of fly ash.
 3. Water: Identify source and quality if not from a municipal treatment source.
 4. Admixtures: Manufacturer's product data indicating suitability for use in CLSM mixes and recommended dosage rates.

5. Aggregate:
 - a. Submit source, type, and sieve analyses. Include testing to demonstrate that materials in accordance with ASTM C33 requirements.
 - b. Resubmit at any time there is a significant change in grading of materials.
- B. Mix design:
 1. Submit full details, including mix design calculations for mix proposed for use.
 2. Trial batch test data:
 - a. Submit data for each test cylinder.
 - b. Submit data that identifies mix and slump for each test cylinder.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store or stockpile cement, fly ash, and aggregate in accordance with ACI 301.
- B. Store admixtures in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Mixture of portland cement, water, pozzolan, fine aggregate and admixtures, proportioned in accordance with the recommendations of ACI 229 to produce a homogeneous mixture that is flowable, that will readily work into corners and angles; that will not segregate in the plastic state; and that is self-compacting at the time of placement without the use of mechanical vibration.
- B. Performance requirements:
 1. Air content, total calculated in accordance with ASTM D6023: Not less than 8.0 percent, nor greater than 12.0 percent.
 2. Compressive strength, measured in accordance with ASTM D4832 at 28 days: Not less than 50 pounds per square inch, nor greater than 150 pounds per square inch.
 3. Wet density: Not greater than 132 pounds per cubic foot.
 4. Slump, measured in accordance with ASTM C143 at the point of placement: Greater than 9 inches and that allows CLSM to flow freely and to be self-compacting during placement.

2.02 MATERIALS

- A. Cement:
 1. Portland cement in accordance with ASTM C150, Type II.
 2. Having total alkali content not more than 0.60 percent.
- B. Fly ash: Class C or Class F fly ash in accordance with ASTM C618.
- C. Water:
 1. Potable water: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.

- D. Admixtures: Products of a single manufacturer, specifically manufactured or recommended by that manufacturer for use in CLSM.
 - 1. Air entraining admixture: In accordance with ASTM C260.
 - 2. Water reducing admixture: In accordance with ASTM C494, Type A.
- E. Aggregate:
 - 1. Non-expansive, non-reactive, inert natural sand conforming to the following requirements:
 - a. Not more than 12 percent passing a No. 200 sieve.
 - b. No plastic fines present.
 - c. Including pea gravel no larger than 3/8 inch.

2.03 MIXES

- A. See Design and Performance Criteria for performance requirements of the plastic and hardened mix.

2.04 SOURCE QUALITY CONTROL

- A. Trial batch:
 - 1. After mix design has been accepted by Engineer, have trial batch of the accepted mix design prepared by testing laboratory acceptable to Engineer.
 - 2. Prepare trial batches using the specific cement, fly ash, admixtures, aggregates, and water proposed for the Work.
 - 3. Prepare trial batch with quantity sufficient to determine slump, workability, and consistency; and to provide test cylinders as indicated in this Section.
- B. Trial batch testing:
 - 1. Determine slump in accordance with ASTM C143, with the following modifications:
 - a. Do not rod the concrete material.
 - b. Place material in slump cone in one semi-continuous filling operation, slightly overfill, tap lightly, strike off, and then measure and record slump.
 - 2. Prepare and test trial batch specimens in accordance with ASTM D4832, with the following modifications:
 - a. Provide cylindrical test specimens, each 6 inches in diameter by 12 inches high.
 - b. Provide a minimum of 8 cylinders for testing of each trial batch.
 - c. Fill the molds to overflowing and tap sides lightly to settle the mix.
 - d. Do not rod the mix for consolidation in the cylinder.
 - e. Strike off the excess material.
 - 3. Place test cylinders in a moist curing room. Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.
 - 4. Do not remove the test cylinder from mold until that cylinder is to be capped and tested.
 - a. Perform the capping carefully to prevent premature fractures.
 - b. Do not perform initial compression test until the cylinders reach a minimum age of 3 days.

5. Provide compressive strength tests:
 - a. Test 4 test cylinders at 7 days after casting, and another 4 cylinders at 28 days after casting.
 - b. The compression strength of the 4 test cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength.
- C. If the trial batch tests do not meet the Specifications for strength or density, revise and re-submit the mix design, prepare additional trial batch(es), and complete additional trial batch tests. Repeat until an acceptable trial batch is that conforms to the Specifications is produced.
 1. All the trial batches and acceptability of materials shall be paid by the Contractor.
 2. After acceptance, do not change the mix design without submitting a new mix design, trial batches, and test information.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not place CLSM until preparation and condition of surfaces receiving the fill have been observed and accepted by the Engineer.
- B. Remove debris foreign matter, and standing or running water from excavations and areas receiving CLSM before placement.

3.02 INSTALLATION

- A. Pipes and trenches.
 1. Install cellular concrete as indicated on the Drawings and specified.
 2. Where CLSM is placed around and over pipes, secure pipes in place, or place CLSM in lifts to prevent pipe flotation.
 3. Where CLSM is placed in long, open trenches, confine material using bulkheads of sandbags, earth dams, or stiffer concrete at open ends of placement.
 4. Place CLSM at specified access points in the abandoned in-place pipe.
- B. Soil preparation:
 1. Prior to placement of CLSM, prepare underlying soils as follows:
 - a. Scarify surface to a depth of 8 inches.
 - b. Adjust moisture content to or slightly above the optimum in accordance with ASTM D698.
 - c. Re-compact scarified surface to a minimum of 95 percent relative density in accordance with ASTM D698.

3.03 MEASURING, BATCHING, MIXING AND TRANSPORTING

- A. Measure, batch, mix and transport CLSM in accordance with the requirements of ASTM C94 and this Section.

- B. Mix until there is uniform distribution of materials.
- C. Discharge mixer completely prior to recharging.
- D. After trial batch testing and mix acceptance, maintain slump during construction within plus or minus 1 inch of the design slump.

3.04 PLACING

- A. Place controlled low strength material by method that preserves the quality of the material in terms of compressive strength and density.
- B. Maintain fluid properties of the mix during placement.
 - 1. At point of placement, provide material that flows easily around, beneath, or through walls, pipes, conduits, or other structures.
 - 2. Do not place CLSM that has partially hardened or that has been contaminated by foreign materials.
 - 3. Handle and place CLSM using methods that minimize segregation of the mix.
 - 4. Deposit mix as near its final position as possible to avoid segregation due to rehandling or flowing.
 - 5. Contain and confine mix while it is fluid. Design containment structures and bracing at walls and forms to withstand lateral pressures of wet mix.
- C. Lifts:
 - 1. Limit lift heights of CLSM placed against structures and other facilities that could be damaged due to the pressure from the CLSM, to the lesser of 3 feet or the lift height indicated on the Drawings.
 - 2. Do not place another lift of CLSM until the last lift of CLSM has set and gained sufficient strength to prevent additional lateral load against the forms or structure due to the weight of the next lift of CLSM.
- D. Water conditions:
 - 1. Do not place CLSM in standing or flowing water.
 - 2. Do not permit water to flow over the surface of freshly placed or un-hardened CLSM.
 - 3. Do not submerge CLSM in water within 24 hours after placement.
- E. Manage CLSM bleed water.
 - 1. Grade top surface of CLSM to drain away from the fill.
 - 2. Provide side containment that permits bleed water to drain to a contained management area away from the fill.

3.05 CURING AND PROTECTION

- A. Curing:
 - 1. Prior to and during curing, install barriers to prevent equipment or personnel from falling into or becoming entrapped in CLSM.
- B. Protect CLSM from:
 - 1. Damage from the elements.
 - 2. Damage of any nature during surrounding construction operations.

3. Freezing: Do not use salt, manure, or other chemicals to provide protection from cold temperatures.

3.06 FIELD QUALITY CONTROL

- A. Provide quality control over the Work of this Section as specified in Section 01450 - Quality Control and as specified in this Section.
- B. General:
 1. Engineer inspection and acceptance required prior to placement.
 2. Make provisions for and furnish all material for the test specimens, and provide manual assistance to assist the Engineer in preparing said specimens.

3.07 FIELD QUALITY ASSURANCE

- A. Provide quality control over the work of this Section as specified in Section 01450 - Quality Control.
- B. Field inspections:
 1. Engineer shall provide on-site inspection for the Work of this Section.
 2. Advise Engineer of readiness to proceed at least 24 hours prior to each placement of CLSM.
 3. Required inspections:
 - a. Engineer will observe the prepared areas. Do not place CLSM until Engineer has observed and accepted preparations.
 4. Record of inspections.
- C. Special tests and inspections:
 1. As specified in Section 01455 - Regulatory Quality Assurance.
- D. Field sampling and testing:
 1. During construction, Contractor shall provide sampling and testing to determine whether the CLSM, as produced and placed, complies with the requirements specified.
 2. Sample CLSM for testing in accordance with ASTM D5971.
 3. Required tests:
 - a. Air content: Prepare sample and test in accordance with ASTM D6023.
 - b. Compressive strength: Prepare and test cylinder specimens in accordance with ASTM D4832.
 - 1) Prepare 6-inch diameter by 12-inch high specimens for testing.
 - a) Provide one set of specimens for each 150 cubic yards of CLSM placed, but not less than 1 set for each half day's placement.
 - b) Prepare and test not less than 3 cylinders for each set.
 - c) Place CLSM in the molds in accordance with ASTM D4832. Do not rod or otherwise consolidate the material in the mold.
 - d) In accordance with ASTM D4832 recommendations for displacing bleed water at the top of the molds and refilling the molds before covering with a lid. Do not use air-tight lids.
 - 2) Place the cylinders in a safe location away from construction activities.
 - a) Protect cylinders from bumping and impact.

- b) Maintain temperature surrounding cylinders between 60 and 80 degrees Fahrenheit until delivery to the laboratory for testing.
- c) After the first day, surround molds with a high humidity environment by covering with wet burlap, or equivalent highly absorptive material. Maintain saturation of the cover. Do not sprinkle water directly on the cylinders.
- 3) After 4 days, place the cylinders in a protective container for transport to the laboratory for testing.
 - a) Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.
 - b) Transport container may be a box with a Styrofoam or similar lining that will limit jarring and bumping of the cylinders.
- 4) Upon receipt at the testing laboratory, place test cylinders in a moist curing room until dates for testing.
- 5) Do not remove test cylinders from molds until the day that cylinders is to be capped and tested.
- 6) Cap and test for compressive strength in accordance with ASTM D4832.
 - a) Do not perform initial compression test until the cylinders reach an age of at least 4 days.
 - b) Test 1 cylinder at 7 days and 2 at 28 days.
- 7) Compressive strength of the cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength specified.

3.08 NON-CONFORMING WORK

- A. When testing or observation indicates CLSM with properties outside the specified and accepted range, Engineer will issue instructions regarding disposition of nonconforming materials.
- B. Engineer may:
 - 1. Reject CLSM represented by those test specimens and require its removal and replacement.
 - 2. Require modification of the mix design to provide CLSM with the properties specified.
- C. Make such modifications at no additional expense to the Owner and with no adjustment to the schedule.

END OF SECTION

SECTION 02318

TRENCHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
1. Trench excavation and trench backfill for pipelines, manholes, vaults, and appurtenances.

1.02 REFERENCES

- A. ASTM International (ASTM):
1. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 2. D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
1. Backfill: Material placed in trench above the pipe embedment zone.
 2. Bedding: Material placed under, around, and over pipes or ducts in trenches.
 3. Fine grading: Bedding material placed directly below pipes or ducts to provide support at the bottom of the trench and to bring those elements to required grades and elevations.
 4. Flexible pipe: Includes steel, ductile iron, thermoplastics such as polyvinyl chloride (PVC) and high-density polyethylene (HDPE), thermosetting plastics such as fiberglass-reinforced polymer (FRP), bar-wrapped concrete cylinder pipe, and corrugated steel pipes.
 5. Haunch zone: Material placed below and beside the pipe up to the pipe springline.
 6. Lift: A layer of soil or aggregate material, measured before compaction.
 7. Maximum density, Field Compaction: Soil density and water content when tested in accordance with ASTM D6938.
 8. Maximum density, Laboratory Compaction: Soil maximum density and optimum water content when tested in accordance with ASTM D698.
 9. Pavement section: Includes pavement plus underlying courses such as base course and subgrade.
 10. Pipe embedment zone: Includes bedding, fine grading, and haunch zone.
 11. Pipe foundation: Material placed at the bottom of trench to provide support.
 12. Pipe springline: A horizontal reference line located at mid-height, or halfway point, of a circular conduit, pipe, or tunnel. It is the maximum horizontal dimension or diameter of a circular conduit, pipe, or tunnel.

13. Rigid pipe: Includes reinforced non-cylinder concrete, reinforced concrete cylinder, prestressed concrete cylinder, vitrified clay, polymer concrete, cast iron, asbestos cement and cast-in-place pipes.

1.04 SUBMITTALS

- A. As specified in Section 01330 - Submittal Procedures.
- B. Product data on soils and aggregates.
 1. Material source.
 2. Gradation.
 3. Test data to demonstrate compliance with requirements as specified in this Section.
- C. Samples:
 1. Provide 50-pound sample of materials when requested by the Engineer.
- D. Confirmation testing:
 1. Certification of Contractor's testing laboratory.
 2. Record copy report for tests performed by the Contractor's testing laboratory.

PART 2 PRODUCTS

2.01 MATERIALS

- A. As specified in Section 02050 - Soils and Aggregates for Earthwork.
- B. Class C concrete: As specified in Section 03301 - Concrete Work
- C. Controlled low-strength material: As specified in Section 02312 - Controlled Low Strength Material (CLSM).

PART 3 EXECUTION

3.01 PREPARATION

- A. Stabilize excavations as needed.
- B. Perform subsurface utility engineering (SUE) for utility locating and verification prior to any excavation work.

3.02 DEWATERING

- A. As specified in Section 02241 - Dewatering.

3.03 TRENCH EXCAVATION

- A. Excavate bottom of trench to depth indicated on the Drawings.

- B. Areas of new fill or embankment:
 1. Prior to laying pipes or electrical service, place fill and compact as specified to not less than 2 feet above top of pipe, conduit, or duct bank.
 2. Excavate through fill for pipe trench.
- C. Trench widths as specified in the following table:

Buried Pipe or Accessory	Minimum Trench Width	Maximum Trench Width
Nominal Pipe Diameter: 4-inch to 24-inch	OD + 18 inches	OD + 24 inches
Nominal Pipe Diameter: Greater than 24-inch	OD + 24 inches	OD + 36 inches
Manholes, vaults, valves, or other accessories	12 inches between outer surface and trench side or shoring	Not applicable

- D. Potable water pipe and appurtenances:
 1. Lay in trenches separate from those used for sewers and recycled water.
 2. Unless otherwise specified or indicated on the Drawings, lay in trenches having cover of not less than 3 feet below surface of ground located at distance of not less than 10 feet clear horizontally from any parallel sewer and 1 foot clear vertically above any parallel sewer.
- E. At road crossings or existing driveways:
 1. Provide notification, vehicular access, and traffic control as required by permits and special conditions.
 2. Provide temporary asphalt or plating for traffic or access at the end of each workday unless approved in writing by the Engineer.
 3. If unexpected utility conflicts or changed Site conditions require trenchless technologies or temporary bridges, immediately notify the Engineer in writing. Approval is required before proceeding with construction.
 4. When trench width at top of pipe is increased beyond width specified in this Section because of soil conditions, safety requirements, or other reasons, Engineer approval for remedy is required without additional cost to the Owner.
 - a. Remedy may include upgrade laying conditions or install stronger pipe designed in accordance with Specifications.

3.04 TRENCH BACKFILL - GENERAL

- A. Trench area terminology and locations as indicated on the Drawings.
- B. Place material, except CLSM and concrete, in maximum 6-inch lifts, measured before compaction.
- C. Backfilling of manhole excavation: In accordance with backfilling requirements for trenches as specified in this Section.

3.05 PIPE FOUNDATION

- A. Provide trench bottom with firm, dry, uniform bearing surface at the grade indicated on the Drawings.
- B. Excess excavation below elevation indicated on the Drawings will require installation of pipe foundation material to bring the trench bottom back to the elevation indicated on the Drawings at no additional cost to the Owner.
 - 1. Materials and placement:
 - a. Stabilization material:
 - 1) Wrap stabilization material as specified in Section 02621 - Stabilization Fabric.
- C. If bottom of trench excavation consists of soil:
 - 1. Scarify bottom of trench to a depth of 6 inches below the grade indicated on the Drawings.
 - 2. Materials and placement:
 - a. Recompact scarified material to 95 percent of maximum density.
- D. If bottom of trench excavation consists of rock or any material that, by reason of its hardness, cannot be excavated to provide uniform bearing surface:
 - 1. Remove such rock or other material to a depth of not less than 4 inches below pipe embedment zone.
 - 2. Materials:
 - a. CLSM.
- E. If bottom of trench excavation consists of mud or other soft unstable material:
 - 1. Remove such unacceptable material to a depth of not less than 18 inches below pipe embedment zone.
 - 2. Material and placement:
 - a. Stabilization material:
 - 1) Wrap stabilization material as specified in Section 02621 - Stabilization Fabric.

3.06 PIPE EMBEDMENT ZONE

- A. Pipe displacement:
 - 1. Take necessary precautions in placement and compaction of bedding material to prevent displacement of piping.
 - 2. In event there is movement or floating of the piping, re-excavate, re-lay, and backfill the pipe.
- B. Fine grading:
 - 1. Place 6 inches of approved haunch zone bedding material from the trench bottom to the bottom of the pipe or duct to provide support at the bottom of the trench and to bring those elements to required line and grade.
- C. Depressions for joints or couplings:
 - 1. Excavate holes in the fine grading material at the bottom of the trench.

2. Provide holes of sufficient width to provide ample room for grouting, banding, or welding as necessary for making joints and to ensure that pipe rests upon prepared trench bottom and not supported by any portion of the joint.
- D. Open Field Area :
1. Pipe embedment zone: Below pipe springline:
 - a. Materials and placement:
 - 1) Sand
 2. Pipe embedment zone: Above pipe springline:
 - a. Compacted to a depth above pipe: 12 inch minimum.
 - b. Materials and placement:
 - 1) Aggregate base course compacted to 95 percent maximum dry density.
- B. Weber River Crossing Area
1. Option #1 FRPMP:
 - a. Concrete Encasement per typical detail CY119/TYP
 2. Option #2 - Steel Casing/HDPE:
 - a. Pipe embedment zone: Below pipe springline:
 - 1) Materials and placement:
 - a) CLMS
 - b. Pipe embedment zone: Above pipe springline:
 - 1) Compacted to a depth above pipe: 12 inch minimum.
 - 2) Materials and placement:
 - a) CLMS
 - c. Contractor to take caution to not float pipe.

3.07 BACKFILL

- A. Trenches:
1. Materials and placement:
 - a. Native soil compacted to 95 percent maximum dry density.
 - b. Aggregate base course compacted to 95 percent maximum dry density.
- B. Trenches below Weber River and Bank
1. Materials and placement:
 - a. Final 2 feet to finished grade
 - 1) Native riverbed and bank material from excavation compacted to 95 percent maximum density.
 - b. Below
 - 1) Native material from excavation compacted to 95 percent maximum dry density
 - 2) Aggregate base course compacted to 95 percent maximum dry density.
- C. Trenches in rock:
1. Backfill to top of rock.
 - a. Materials and placement:
 - 1) CLSM.
 - 2) Class C concrete.

2. Backfill from top of rock to grade, if applicable:
 - a. Materials and placement:
 - 1) Aggregate base course compacted to 95 percent of maximum density.
- D. Trenches below or within 10 feet of the outside perimeter of structures:
 1. Backfill to underside of structural fill below structure, as specified in Section 02300 - Earthwork.
 2. Materials and placement:
 - a. Aggregate base course compacted to 95 percent of maximum density.
 - b. CLSM.
- E. Trenches in roadways and paved areas:
 1. Backfill trench to underside of pavement.
 2. Materials and placement:
 - a. Aggregate base course compacted to 95 percent of maximum density.
 - b. CLSM.
- F. Trenches in areas outside the improved section of roadways or in open country:
 1. Backfill to finished grade.
 2. Materials and placement:
 - a. Native soil, imported material, or aggregate base course compacted to 90 percent of maximum density.
- G. Trenches under existing intersecting pipes, duct banks, or conduits larger than 3 inches in diameter:
 1. Backfill from above top of new pipe embedment zone to springline of intersecting pipe or conduit.
 - a. Extend backfill at least 2 feet on either side of intersecting pipe or conduit to ensure backfill material remains in place while other backfill is being placed.
 - b. Materials and placement:
 - 1) CLSM, unless otherwise indicated on the Drawings.
 2. Backfill remainder of trench:
 - a. Materials and placement:
 - 1) CLSM.
 - 2) Class C concrete.

3.08 EXCESS MATERIAL

- A. Remove excess excavated material from the Project Site as specified in Section 02300 - Earthwork.

3.09 FIELD QUALITY CONTROL

- A. Provide field quality control for the Work as specified in Section 01450 - Quality Control.

- B. Confirmation tests: As specified in Section 02300 - Earthwork.
 - 1. Minimum frequency of confirmation testing:
 - a. At each test location include tests for each type or class of backfill from bedding to finished grade.
 - b. For trenches: 1 location every 200 linear feet.
 - c. In open fields: 2 locations every 1,000 linear feet or 1 location every 200 cubic yards.
 - d. Along dirt or gravel road or off traveled right-of-way: 1 location at every 500 linear feet.
 - e. Crossing paved roads: 1 location at each crossing.
 - f. Under pavement cuts or within 2 feet of pavement edges: 1 location every 400 linear feet.

- C. Compliance tests:
 - 1. Make periodic compliance tests to verify that compaction is meeting requirements as specified in this Section.
 - 2. Perform remedial work if compaction test fails to meet specified requirements using one of the following methods:
 - a. Remove and replace backfill at the proper density.
 - b. Other means acceptable to the Engineer.
 - 3. Retesting:
 - a. Costs of retesting: Contractor is responsible for the costs of retesting required to confirm and verify that remedial work has brought compaction within specified requirements.
 - b. Contractor's confirmation tests during performance of remedial work:
 - 1) Performance: Perform tests in manner acceptable to the Engineer.
 - 2) Frequency: Double amount specified for initial confirmation tests.

- D. Piping system testing:
 - 1. As specified in Section 02009 - Piping Systems Testing.

END OF SECTION

SECTION 02351

GEOGRID REINFORCEMENT FOR TRENCH BOTTOM

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Geogrid reinforcement located under pipes in trenches.
 - 2. Design details for geogrid reinforcement, such as geogrid type, fill thickness, cross-section and associated details, shall be as indicated on the contract drawings.
 - 3. Work consists of:
 - a. Furnishing geogrids as specified in this Section and indicated on the Drawings.
 - b. Storing, cutting, and placing geogrids in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions indicated on the Drawings or as established by the Engineer.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specification for Highway Bridges.
- B. ASTM International (ASTM):
 - 1. D1388 - Standard Test Method for Stiffness of Fabrics.
 - 2. D6637- Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-rib Tensile Method.
 - 3. D4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics.
- C. Geosynthetic Research Institute (GRI):
 - 1. GG2 - Standard Test Method for Geogrid Junction Strength.

1.03 DEFINITIONS

- A. Aperture Stability Modulus (also known as Torsional Rigidity or Torsional Stiffness): Resistance to in-plane rotational movement measured by applying a 20 kg-cm moment the central junction of a 9-inch by 9-inch specimen restrained at its perimeter. Values shown are MARVs. For multi-layer geogrid products, torsional stiffness testing shall be performed on each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers.
- B. Flexural Stiffness (also known as Flexural Rigidity): Resistance to bending force measured in accordance with ASTM D1388, Option A, using specimen dimensions of 864 millimeters in length by 1 aperture in width. Values shown are MARVs. For multi-layer geogrid products, flexural stiffness testing shall be performed directly on

the multi-layer configuration without using any connecting elements other than those used continuously throughout the actual product, and results shall not be assumed as additive from testing performed on a single layer of the multi-layer product.

- C. Geogrid: A biaxial polymeric grid formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth to function primarily as reinforcement.
- D. Junction Strength: Breaking tensile strength of Junctions when tested in accordance with GRI GG2 as modified by AASHTO Standard Specification for Highway Bridges, using a single rib having the greater of 3 junctions or 8 inches and tested at a strain rate of 10 percent per minute based on this gauge length. Values shown are minimum average roll values. For multi-layer geogrid products, Junction strength testing shall be performed across junctions from each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers.
- E. Minimum Average Roll Value (MARV): Value based on testing and determined in accordance with ASTM D4759.
- F. Multi-Layer Geogrid: A geogrid product consisting of multiple layers of grid which are not integrally connected throughout.
- G. Subgrade Improvement: Placement of a geogrid immediately over a soft subgrade soil in order to improve the bearing capacity and mitigate deformation of the subgrade soil. The goal of this application may be to reduce undercut requirements, improve construction efficiency, reduce the amount of aggregate subbase/base material required, provide a stiff working platform for pipe construction, or combination of these.
- H. True Initial Modulus in Use: The ratio of tensile strength to corresponding zero strain. The tensile strength is measured in accordance with ASTM D6637 at a strain rate of 10 percent per minute. Values shown are MARVs. For multi-layer geogrid products, rib tensile testing shall be performed on the multi-layer configurations, in accordance with ASTM D6637.
- I. Welded Strip Geogrid: A geogrid product formed by heat bonding (welding) discrete strips of polymer into a regular network.
- J. Woven geogrid: A geogrid product formed by weaving discrete strips of polymer into a network, these geogrids usually require a protective coating to protect the polymer from pre-mature degradation.

1.04 SUBMITTALS

- A. Submit geogrid product sample approximately 12 inches by 12 inches or larger.
- B. Submit geogrid product data sheet and certification from the Manufacturer that the geogrid product supplied meets the requirements of “Structural Soil Reinforcement Geogrid” of this Section.

- C. Submit manufacturer's installation instructions and general recommendations.
- D. For alternate geogrid materials not meeting the requirements of "Structural Soil Reinforcement Geogrid" of this Section, the following apply:
 - 1. Independent certified test results stating that the alternate geogrid exhibits an aperture stability modulus at 20cm-kg, when testing in accordance with the "Grid Aperture Stability In-Plane Rotation" test of 3.2 cm-kg/deg (for Type 1) or 6.5 cm-kg/deg (for Type 2).
 - 2. A list of 5 comparable projects that are similar in terms of size and application, are located in the United States, and where the results of using the specific alternate geogrid material can be verified after a minimum of 1 year of service life.
 - 3. A sample (meeting the requirements of this Section) of the alternate geogrid material and certified specification sheets.
 - 4. Recommended installation instructions.
 - 5. Additional information as requested by the Engineer to fully evaluate the product.

1.05 QUALITY ASSURANCE

- A. Pre-construction conference: Prior to the installation of the geogrid, the Contractor shall arrange a meeting at the site with the geogrid material supplier and, where applicable, the geogrid installer.
 - 1. The Owner and the Engineer shall be notified at least 3 days in advance of the time of the meeting.
 - 2. A representative of the geogrid supplier shall be available on an "as needed" basis during construction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection:
 - 1. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.
 - 2. Store at temperatures above -20 degrees Fahrenheit (-29 degrees Celsius).
 - 3. Rolled materials may be laid flat or stood on end.
 - 4. Geogrid materials should not be left directly exposed to sunlight for a period longer than recommended by the manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Geogrid:
 - 1. Manufacturers: The following or equal:
 - a. Tensar Corp., Tensor BX 1100.
 - b. US Fabrics, US BaseGrid 11

2.02 DESIGN AND PERFORMANCE CRITERIA

- A. Design in accordance with manufacturer's recommendations.
- B. Performance requirements:
 - 1. Subgrade improvement applications:
 - a. The reinforcement benefit attributed to the geogrid shall be as derived by the Giroud-Han, Method.
 - b. Appropriate partial safety factors shall be applied to results obtained using geogrids having properties or characteristics outside the range of rigorous model validation (Giroud and Han, 2001).

2.03 MATERIALS

- A. Structural soil reinforcement geogrid: The geogrid shall be integrally formed and deployed as a single layer having the following characteristics (All values are minimum average roll values unless a range or characteristic is indicated):

Property	Test Method	Units	Value
Aperture Stability Modulus at 20 cm-kg	Kinney - 01	cm-kg/deg	3.2
Rib Shape	Observation	N/A	Rectangular or Square
Rib Thickness	Calipered	in (mm)	0.03 (0.76)
Nominal Aperture Size	I.D. Calipered	in (mm)	1.0 to 1.5 (25 to 33)
Flexural Rigidity	ASTM D1388	mg-cm	250,000
Junction Efficiency	GRI-GG2		93
Minimum True Initial Modulus in Use	ASTM D6637		
- MD		lb/ft (kN/m)	17,140 (250)
- CMD		lb/ft (kN/m)	27,420 (400)

- B. Alternate structural soil reinforcement materials: Alternate structural soil reinforcement materials will be considered in accordance with the following conditions:
 - 1. Geotextile materials will not be considered as an alternate to geogrid materials for subgrade improvement or base/sub-base reinforcement applications.
 - a. A geotextile may be used in the cross-section to provide separation, filtration or drainage; however, no structural contribution will be attributed to the geotextile.
 - 2. Alternate geogrid materials shall not be used unless submitted to the Engineer and pre-approved in writing by the Engineer.
 - a. In order to be considered, submittal packages for alternate geogrid materials must be prepared and submitted as specified in this Section.

PART 3 EXECUTION

3.01 EXAMINATION

- A. The Contractor shall check the geogrid upon delivery to verify that the proper material has been received.
 - 1. The geogrid shall be inspected by the Contractor to be free of flaws or damage occurring during manufacturing, shipping, or handling.

3.02 PREPARATION

- A. The subgrade soil shall be prepared as indicated on the Drawings or as directed by the Engineer.
 - 1. In areas where wet, soft or easily disturbed soils are present in the excavation bottom, a careful horizontal trimming action with a smooth-edge bucket shall be used for the last several feet of soil excavation to help reduce disturbance of sensitive cohesive subgrade.
 - 2. Care shall be taken not to impose unnecessary or excess impact loads on subgrade soils during geogrid or granular fill placement.

3.03 INSTALLATION

- A. The geogrid shall be laid at the proper elevation and alignment as indicated on the Drawings.
- B. The geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer.
- C. The geogrid may be temporarily secured in place with ties, staples, pins, sandbags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the Engineer.

3.04 GRANULAR FILL PLACEMENT OVER GEOGRID

- A. After placement of the grid on soil subgrade, place an 8- to 12-inch thick layer of Type "A" crushed stone as specified in Section 02318 - Trenching.

3.05 INSPECTION

- A. The Owner or Owner's representative may randomly inspect geogrid before, during and after (using test pits) installation.
- B. Any damaged or defective (i.e. frayed coating, separated junctions, separated layers, tears, etc.) will be repaired/replaced as specified in this Section.

3.06 REPAIR

- A. Any roll of geogrid damaged before, during and after installation shall be replaced by the Contractor at no additional cost to the Owner.
- B. Proper replacement shall consist of replacing the affected area plus 3 feet of geogrid to either side of the affected area.

3.07 PROTECTION

- A. Follow the Manufacturer's recommendations regarding protection from exposure to sunlight.

END OF SECTION

SECTION 02552

TEMPORARY BYPASS PUMPING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section describes the requirements for temporary bypass pumping of wastewater flows as needed to complete the Work.
- B. Refer to drawings for possible bypass pumping configuration. Ultimate configuration is responsibility of contractor.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Material.
- B. National Fire Protection Association (NFPA):
 - 1. 820 - Standard for Fire Protection in Wastewater Treatment and Collection Facilities.

1.03 REQUIREMENTS

- A. Provide all services related to, but not limited to, mobilization, setup, around-the-clock operations and maintenance, demobilization, traffic control, permits, and all other materials, labor, and equipment to install, maintain, and operate a complete continuous pumping and transport system for wastewater 24 hours per day, 7 days per week, until the portion(s) of the Work have been completed to the satisfaction of the Engineer.
- B. The means and methods of accomplishing and maintaining the temporary bypass pumping and associated facilities is the sole responsibility of Contractor.
- C. The temporary bypass pumping system shall be installed as a complete standalone system.
 - 1. Provide power, fuel, and backup power supply and/or backup pumps for operation of the system.
- D. The temporary bypass pumping operation shall be limited to the months or seasons indicated in the Work, unless approved in writing by the Engineer.
- E. The temporary bypass pumping shall be continuously monitored.

- F. Contractor shall be responsible for bypassing wastewater in a way that ensures that no wastewater is allowed to leak outside of the sanitary sewer system or the bypass pipelines, or back up and flood residency basements or commercial buildings.
 - 1. Bypass pumping shall be done in such a manner as not to damage private or public or private property, or create a nuisance or public menace.
 - 2. The pumped wastewater shall be in an enclosed pipe that is adequately protected from traffic, and shall be redirected into sanitary sewer system.
- G. No bypassing to the ground surface, receiving waters, storm drains, or bypassing that results in soil or groundwater contamination or any potential health hazards shall be permitted.
 - 1. Contractor shall adhere to all agency restrictions regarding the transport and conveyance of wastewater.
- H. Contractor shall be liable for all cleanup, damages, and resultant fines in the event of spills, leaks, or backups associated with bypass pumping activities, which includes commissioning, operation, and decommissioning of bypass pumping facilities.
- I. No interruption of wastewater flow shall be permitted throughout the duration of the project. Contractor is responsible for all sanitary sewer overflows during construction of this Work and bypass operations.
- J. Coordinate the placement of the bypass piping and pumping equipment with Engineer.
- K. Where bypass pipelines are required to cross traffic lanes, and will be in place for more than 3 days, the piping and fittings shall be buried a minimum of 4 inches below the pavement surface and backfilled with temporary asphalt concrete surfacing or use an approved flow-through drivable apparatus approved by Engineer.
 - 1. At no time shall traffic lanes be blocked or closed, unless specifically allowed in writing by Owner.
- L. After the Work is completed, flow shall be returned to the rehabilitated sewer and all temporary equipment removed.

1.04 SUBMITTALS

- A. Contractor shall submit a temporary bypass pumping plan as required to complete the Work to Engineer and Owner, 10 days prior to bypass pipe installation, for review as specified in Section 01330 - Submittal Procedures.
- B. The temporary bypass pumping plan submittal shall be satisfactory to Engineer and Owner prior to Contractor commencing the bypass pumping operation.
 - 1. Contractor shall notify Engineer and Owner 24 hours prior to commencing the bypass pumping operation.
- C. The temporary bypass pumping plan must provide for accessibility to pedestrians and vehicular traffic in accordance with Owner requirements.

- D. The temporary bypass pumping plan shall include the following at a minimum:
1. Number, type, capacity, and size of pumps, standby equipment, pipe material, pipe layout with pressure relief, and air/vacuum valves locations, and power requirements, if applicable.
 2. Design calculations of the system and selected equipment, including flow, TDH with static head including all friction and minor losses, and pump curves showing operating range of flow and TDH.
 3. Standby power generator size and location for electrically driven bypass pumps.
 4. Downstream Discharge Plan.
 5. Pipe thrust and restraint block sizes and locations.
 6. Temporary pipe supports and anchoring required.
 - a. The bypass corridor lies within a flood zone, therefore buoyancy restraint is required.
 - b. Buoyancy calculations are required.
 7. Schedule that shows duration of temporary bypass pumping including milestones for installation, maintenance, and removal of equipment and accessories.
 8. Means and methods of installing, operating, monitoring, and maintaining the temporary bypass pumping shall be provided.
 9. Plan indicating bypass pumping line locations.
 - a. Plan shall include details showing methods used to protect and identify the bypass pumping lines through the length of the bypass corridor.
 10. Plans for access to bypass pumping locations.
 11. Detailed plans of a redundant backup system.
 12. Address access for pedestrians and vehicular traffic.
 13. Mechanical plan showing equipment, valves, pipe sizes and locations, pipe materials, dimensions, vehicle access (where applicable), pedestrian access (where applicable).
 14. Proposed type, catalog cutsheets, and location of collection system plugs.
 15. Emergency Response Plan.
 16. Staffing Plan.
 17. Spill prevention and cleanup plan.
 18. Method of noise control.
 19. Health and Safety Plan.
 20. Catalog cutsheets for all pumping equipment including pump performance curves, all pipe and fittings, all valves, noise reduction system, and health and safety plan.

1.05 QUALITY ASSURANCE

- A. Contractor's qualifications:
1. Minimum 5 years of experience in performing substantially similar temporary bypass pumping operations.
 2. Submit list of at least 5 separate construction projects completed within the last 10 years that include the satisfactory setup, operation, and maintenance of a pumping and piping system used to bypass wastewater during construction similar to the specified Work.
- B. Fulfillment of the specified experience requirements shall be a condition of acceptance.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Contractor shall request flow data from Owner to determine the appropriate range of design flows and design total dynamic head (TDH). The following criteria shall be determined at a minimum:
 - 1. Minimum Flow: 2.5 million gallons per day.
 - 2. Average Daily Flow: 3.7 million gallons per day.
 - 3. Peak Flow: 6 million gallons per day.

2.02 CAPACITY

- A. Pumps, piping, and accessories shall be of adequate capacity and size to handle the range of wastewater flows from Minimum Flow to Peak Flow.
- B. All piping, fittings, and all accessories shall withstand 1.5 times the maximum pressure.
- C. Contractor shall maintain on site sufficient equipment and materials to ensure continuous and successful operation of the bypass system.
 - 1. Contractor shall have standby pump(s) incorporated into the system that provide 100-percent redundancy of the bypass system design Peak Flow.
 - a. The redundant pump(s) shall be plumbed, fueled, and available for operation at all time for emergency backup.
 - 2. Contractor shall install sufficient bypass lines to provide 100 percent redundancy of the bypass system design Peak Flow.
 - a. The bypass lines and separate redundant lines shall be connected via a combined header that enables the shutdown and isolation of each individual line should a leak or rupture occur.
 - 3. Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, pipe plugs, piping, and other parts or system hardware to ensure immediate repair or modification of any part of the bypass system as necessary.

2.03 BYPASS PUMPS

- A. A minimum of 2 pumps shall be provided, each capable of transporting 100 percent of the peak flow.
- B. Pump capacity shall be sufficient to pump the anticipated peak hour flow with the largest pump out of service.
- C. Pumps shall be a packaged unit with a skid base or 2-wheel trailer.
- D. Pumps shall be fully automatic, self-priming, close-coupled centrifugal units that do not require use of foot valves or vacuum pumps for priming.
- E. Pumps shall utilize oil-lubricated mechanical seal.

- F. Pump materials shall be as follows:
 - 1. Volute: Cast iron.
 - 2. Impeller: Cast iron.
 - 3. Pump shaft: Type 431 stainless steel.
 - 4. Mechanical seal faces: Silicon carbide.
- G. Pumps shall be capable of passing 4-inch diameter solids, rags, rocks, hair, and other debris encountered in municipal wastewater.
- H. Pumps shall be operated by 480-volt electric engine and include the following:
 - 1. Minimum 24-hour capacity diesel fuel tank as defined by fuel consumption during peak pumping rate.
 - 2. Fuel gauge with red warning light when tank approaches empty.
- I. Pumps shall be capable of dry operation for up to 5 hours to accommodate large fluctuations in flow.
- J. Maximum pump speed shall not exceed 2,200 revolutions per minute.
- K. The system shall include the following features:
 - 1. START/STOP operation.
 - 2. Instrumentation and controls for operation and monitoring for each pump.
 - 3. Variable flow based on water level in suction structure.
- L. All electrical equipment, instrumentation, and accessories shall be suitable for Class 1 Division 1 service in accordance with NFPA 820.

2.04 BYPASS PIPING

- A. Contractor shall use HDPE piping for the temporary bypass pumping system.
- B. All piping shall have no leakage and shall include spill containment vessels or "spill guards" in areas indicated on the Drawings.
- C. HDPE Piping shall be as follows:
 - 1. In accordance with ASTM D3350.
 - 2. Minimum SDR of 32.5.
 - 3. Joints shall be butt-fusion welded.

2.05 PIPE PLUGS

- A. Pipe diameters 24 inches and smaller shall use mechanical plugs with EPDM gaskets.
- B. Pipe diameters larger than 24 inches shall use inflatable bag stoppers with 2 or more pieces.

2.06 NOISE CONTROL

- A. Pump equipment shall be equipped with devices or enclosures for noise attenuation, which includes, but is not limited to, mufflers and/or plywood/Styrofoam noise panels.
- B. The noise level shall be at or below 75 dBA at 50 feet from the pumping equipment for the duration of the Work.

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor shall notify Owner a minimum of 30 days prior to the Work requiring temporary bypass pumping and notify Engineer at least 48 hours prior to bypassing or diverting flow in any of the pipelines or laterals or structures.
- B. All pumps, generators, and other equipment shall be placed on a plastic tarp to protect against spills of petroleum products used by the equipment.
- C. Before taking interceptor out of service, Contractor shall verify that bypass system is fully operational and acceptable to Engineer.
- D. Flow in the existing sewers shall not be restricted or dammed for any period of time without the approval of Engineer.
- E. All wastewater facilities, including laterals, shall remain in continuous and full operation during construction.

3.02 PROTECTION

- A. All pumps and piping shall be sized to adequately convey the flows anticipated at each bypass application.
 - 1. The bypass system shall be watertight; no leakage will be allowed.
- B. Contractor shall be responsible for all bypass flows.
 - 1. Contractor shall inspect the entire bypass pumping and piping system for leaks or spills at a frequency of not less than 4 times per shift.
 - 2. The temporary bypass system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from Engineer.
- C. The temporary bypass system will have trained and qualified attendants available 24 hours per day 7 days per week whose only duty is to maintain the bypass system until the bypassing of the system is no longer required. The attendants shall:
 - 1. Be capable of performing pump and piping maintenance required.
 - 2. Have a cellular phone for communication with Contractor and Engineer in the event of emergencies.

- D. In the event of any wastewater spill, Contractor shall be responsible for the prompt cleanup and disinfecting of the spill as called for in the temporary bypass pumping plan.
 - 1. Contractor shall compensate Owner for the cost of any fines levied as the result of a spill or unauthorized discharge.
- E. Contractor shall implement measures to prevent interference between the public and the bypass pumping equipment, pipelines, and wastewater.
- F. Contractor shall take precautions to protect all bypass lines from damage.
 - 1. Any aboveground portions of the bypass lines shall be clearly identified by flashers, fencing, or other means to warn the public of their presence.

3.03 FIELD QUALITY CONTROL

- A. Hydrostatic Pressure Test:
 - 1. Prior to operation, test each section of discharge piping with maximum pressure equal to 2.0 times the maximum operating pressure.
 - 2. The test shall run for a duration of 4 hours.
 - 3. Contractor shall fill the line with water.
 - 4. The line shall be sealed on the discharge end.
 - 5. The line may be put in service if, after the specified test duration, the pressure has been maintained and there are no observable leaks.
 - 6. Notify Engineer at least 48 hours prior to testing.
- B. Inspection:
 - 1. An attendant/operator shall inspect temporary bypass piping system at a minimum of every hour 24 hours per day.
 - 2. An attendant/operator shall be present to monitor the operation of the bypass pumps at all times, 24 hours per day.
 - 3. Inspection Log: Keep at each pumping location.

3.04 CLEAN-UP

- A. The temporary bypass pumping system shall be cleaned and drained prior to being dismantled.
- B. Contractor shall alternate pigging and purging of the system to remove all loose material.
 - 1. After Contractor has cleaned the pipe, and prior to dismantling of the piping for removal from the project site, Contractor shall disinfect the pipe with 10-percent chlorine solution.
- C. Disturbed Areas:
 - 1. Upon completion of bypass pumping operation, clean disturbed areas, restoring to original condition, including pavement restoration, at least equal to that which existed prior to start of Work.

3.05 SCHEDULING

- A. The temporary bypass pumping system shall not be shut down between shifts, on holidays or weekends, or during work stoppages.
- B. The bypass system shall have trained and qualified attendants 24 hours per day, 7 days per week whose only duty is to maintain the bypass system from the start of bypass until the bypassing of the system is no longer required.

END OF SECTION

SECTION 02601

PRECAST REINFORCED POLYMER CONCRETE MANHOLES AND VAULT STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for precast reinforced polymer concrete manholes and vault structures.
 - 2. Requirements govern both manholes and vaults structures, unless specified otherwise.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specifications for Highway Bridges.
- B. ASTM International (ASTM):
 - 1. A48 - Standard Specification for Gray Iron Castings.
 - 2. C33 - Standard Specification for Concrete Aggregates.
 - 3. C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - 4. C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
 - 5. C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
 - 6. C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - 7. C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
 - 8. C923 - Standard Guide for In-Plant Performance Evaluation of Automatic Pedestrian SNM Monitors.
 - 9. C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Performed Flexible Joint Sealant.
 - 10. C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
 - 11. D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position.
 - 12. D2584 - Standard Test Method for Ignition Loss of Cured Reinforced Resins.
- C. Sewer Manhole and Service Connection Standards, Central Weber Sewer Improvement District, July 2022 or latest version.
- D. International Organization of Standardization (ISO):
 - 1. 9001 - Quality Management Standard.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data:
 - 1. Manufacturer certification showing that acid resistant polymer manhole design meets or exceeds the load and strength requirements in accordance with ASTM C478, ASTM C497, and ASTM C857.
 - 2. Test methods and results including certification that manhole riser exceeds the minimum requirements in accordance with ASTM C478 and ASTM C579, including:
 - a. Concrete cylinder compression test results.
 - 3. Certificates:
 - a. ISO 9001 certificate by a third party confirming that ASTM test reports are valid and up to date at the time of the bid and during construction period.
 - b. Manufacturer's Certificate of Source Testing.
 - 4. Manufacturer method for addressing infiltration in areas where groundwater is present that is in accordance with the Owner requirements.
- C. Shop Drawings:
 - 1. Submit manufacturer's data and details of following items for approval:
 - a. Frame and covers.
 - b. Grade rings.
 - c. Manhole cones and risers.
 - d. Manhole bases, if precast.
 - 2. Manhole construction details, jointing methods, connection details, materials, and dimensions.
 - 3. Repair procedures and details.
 - 4. Sealed drawings and design calculations by a registered Professional Engineer licensed in the state where the project is located.
- D. Calculations and criteria used in manhole design including material properties, loadings, load combinations, and dimensions assumed.

1.04 PRODUCT REQUIREMENTS

- A. As specified in Section 01601 - Product Requirements.
- B. Provide suitable quantities of lifting equipment to handle the manholes/risers and castings.
 - 1. In no case shall any equipment be used that is not rated to handle the intended loading or conditions of use to which it will be subjected, or which will damage or gouge the manhole components.
 - 2. Dragging or dropping the manhole components shall not be allowed.
- C. Source Testing.
 - 1. Perform pre-production and post-production tests by manufacturer staff with a minimum of 5 years of experience in quality control, inspection, and testing of manholes.
 - a. In lieu of this experience, witness of tests by up to 3 full-time Owner representatives.

2. Provide the Manufacturer's Certificate of Source Testing.

1.05 WARRANTY

- A. As specified in Section 01783 - Warranties and Bonds.
- B. Special warranty:
 1. Provide 50-year warranty stating that if the maximum wall thickness loss due to corrosion exceeds 0.75 inches, the Owner will not be responsible for manhole repair costs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manhole grade rings, cones, and risers:
 1. One of the following, or equal:
 - a. Armorock.
- B. Manhole frames and covers:
 1. The following:
 - a. D&L Supply, model A-1180.

2.02 DESIGN AND PERFORMANCE CRITERIA

- A. Manholes shall not include steps.
- B. Manhole lids: Locking type.
- C. Manhole bases:
 1. Constructed as part of the pipe installation or using tee risers.
- D. Manhole riser:
 1. Made of the same pipe material selected for the project, providing a sealed connection between the pipe base and riser as indicated on the Drawings.
 2. Manufactured specifically for this project and no materials shall be furnished from stock unless approved by the Engineer.
- E. Manhole provider shall coordinate with the pipe manufacturer for dimensions and connections.
- F. Manhole systems:
 1. Provided by a single manufacturer.
- G. Frames and covers:
 1. Provided by a single manufacturer unless approved by the Engineer.

2.03 BASIS OF DESIGN

- A. Design in accordance with local jurisdiction requirements, Sewer Manhole and Service Connection Standards, including, but not limited to, the following:
 - 1. Manhole frames and covers.
 - 2. Manhole diameter tolerance.
 - 3. Manhole length.
 - 4. Manhole cover bolting.
 - 5. Manhole backfill.

- B. Structural design calculations:
 - 1. Load rating of manhole:
 - a. Design to support an AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading.
 - 2. Resist buoyancy:
 - a. Design with sufficient bottom anchorage and side friction to resist buoyancy.
 - b. Depths will be as indicated on the Drawings.
 - c. Refer to the geotechnical report for soil condition including fully saturated soil conditions.
 - d. Anti-flotation flange:
 - 1) Exterior of manhole riser shall incorporate a 3-inch wide flange at its base.
 - 2) Upon joining of manhole riser to pipe tee, place sufficient concrete around tee and manhole riser to prevent buoyancy.
 - 3) Encase anti-flotation flange in a minimum of 6 inches of concrete.

- C. Free from defects, including indentations, cracks, foreign inclusions, and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part.

- D. Maximum variation of internal diameter of manhole components: 1 percent.

- E. Maximum variation in height of 2 opposite sides of risers and conical tops: 5/8 inch.

- F. Maximum under run height of a riser or conical top: 1/4 inch per foot of height with a maximum of 1/2 inch in any one section.

- G. Provide steel reinforcement in accordance with ASTM C478 or fiberglass reinforcement.

- H. Manhole grade rings, risers, and bases:
 - 1. Manhole:
 - a. Nominal sizes as indicated on the Drawings.
 - 2. Grade rings:
 - a. At least 1 but not more than 2 grade rings shall be used.
 - b. Maximum total distance from top of cone section to final grade: 18 inches.
 - 3. Cone and riser sections:
 - a. As specified in this Section and as indicated on the Drawings.
 - 4. Manhole bases:
 - a. As specified in this Section and as indicated on the Drawings.

- b. Provide corrosion protection system on unlined concrete.
- I. Threaded lifting inserts:
 - 1. Design inserts to be fully threaded:
 - a. Do not fully penetrate through entire manhole wall.
 - 2. Compatible with spreader bar and chains, hooks and slings.
 - 3. Minimum safety factor of 4.0.
 - 4. Do not use reinforcing steel bars.

2.04 IDENTIFICATION MARKINGS

- A. Identification marks on the exterior of bases, risers, grade rings, and include the following information:
 - 1. Date of manufacture of the item.
 - 2. Name or trademark of the manufacturer.
 - 3. Internal diameter in inches.
 - 4. Number of the manhole as indicated on the Drawings.

2.05 QUALITY CONTROL

- A. Manufacturer to provide permanent quality control department and laboratory facility capable of performing inspections and testing as specified by this Section.
- B. Material testing, inspection procedures, and manufacturing process are subject to inspection by the Owner or Owner's representative.
- C. Perform manufacturer's tests and inspections in accordance with the referenced standards and as specified in this Section, including the following:
 - 1. Provide the Manufacturer's Certificate of Source Testing as specified in Section 0160001601 - Product Requirements.
 - 2. Manufacturer shall make available services of representative throughout the project duration when deemed necessary by the Engineer.
 - 3. Calibrate within last 12 months for equipment such as scales, measuring devices and calibration tools used in the manufacturing of pipe.
 - a. Each device used in the manufacture of manholes is required to have a tag recording date of last calibration.
 - b. Devices are subject to inspection by the Engineer.
- D. Furnish labor necessary to assist the Engineer in inspecting manholes upon delivery.
- E. Remove rejected manholes immediately.

2.06 MATERIALS

- A. Cast iron manhole frames and covers:
 - 1. In accordance with ASTM A48.
 - 2. Provide bolted covers as specified and as indicated on the Drawings.
 - 3. Provide concrete collars as specified and as indicated on the Drawings.

- B. Manhole risers, transition slabs, conical tops, grade rings, and manhole base sections in accordance with ASTM C478 and ASTM C857 as modified to accept polymer construction in lieu of concrete as follows:
1. Polymer mixture:
 - a. Ingredients: Consist solely of thermosetting resin, sand, and aggregate.
 - 1) No cementitious materials shall be allowed.
 - b. Show required wall thickness for members in Shop Drawings.
 - c. Design to resist hydrostatic pressures with a minimum safety factor of 2.0 for full depth conditions from grade to riser connection point.
 - d. Minimum wall thickness:
 - 1) 72-inch diameter manholes: 3-inches.
 - 2) 48-inch and 60-inch diameter manholes: 2-inches.
 - e. Minimum unconfined compressive strength in accordance with ASTM C497: 9,000 pounds per square inch.
 2. Provide riser sections joined with bell and spigot or ship-lap design seamed with butyl mastic or elastomeric gasket so that on assembly, manhole base, riser and top section make a continuous and uniform manhole.
 3. Construct riser sections for polymer concrete manholes from standard polymer concrete manhole sections of the diameter as indicated on the Drawings.
 4. Use various lengths of manhole sections in combination to provide correct height with the fewest joints.
 5. Design wall sections in accordance with ASTM C478, design to support an AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading and manufacturer's recommendations.
 6. Provide concentric transition cone sections to transition to a 36-inch diameter frame and cover.
- C. Thermosetting resin:
1. Minimum of deflection temperature when tested at 264 pounds per square inch in accordance with Test Method ASTM D648: 158 degrees Fahrenheit.
 2. Minimum resin content tested in accordance with test method ASTM D2584: 7 percent of the weight of the sample.
 3. Material: Polyester or vinyl ester suitable for applications in the corrosive conditions to which the structures will be exposed.
 4. Resin additives such as curing agents, pigments, dyes, fillers, and thixotropic agents, cannot be detrimental to the manhole.
- D. Filler:
1. Materials:
 - a. Aggregate, sand, and quartz powder.
 - b. In accordance with ASTM C33, where applicable.

2.07 COMPONENTS

- A. Manhole joints: Bell and spigot or shiplap.
- B. Joint sealing surfaces: Free of dents, gouges and other surface irregularities that would affect joint integrity.
- C. Joint sealant:
1. Elastomeric gaskets suitable for the service intended.

2. Gaskets: In accordance with ASTM C443 and C990.
- D. Vault access hatch:
1. Where openings for access to the vault are required.
 2. Provide full clear space opening indicated on the Drawings without obstructions.
 - a. Large openings:
 - 1) Brackets or supports are designed to protrude into the opening for support of required covers.
 - 2) Design brackets or supports to be easily removed and replaced with a minimum of effort and without cutting or welding.
 - b. Vaults: Aluminum plate hinged floor access door (hatch) as specified:
 - 1) Load rating:
 - a) "Heavy Duty" for covers.
 - 2) Minimum access door size not less than 36 inches square, unless otherwise indicated on the Drawings.
 - 3) Provide bearing surface with pre-installed continuous elastomeric gasket to minimize water infiltration at lid.
 - 4) Provide skid-resistant lid with cast-in or machined-in grid pattern.
 - 5) Manufacturers: One of the following, or equal:
 - a) Babcock Davis Associates, Inc., Model BFDDH-SAL or BFDDH DAL (double leaf).
 - b) The Bilco Co., Model JH-20 or JDH-20 (double leaf).
 - 6) Style: Double leaf.
 - 7) Material: Aluminum.
 - a) Design to support an AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading with a maximum deflection of 1/150 of the span, live load channel frame, with drainage couplings.
 - 8) Door leaf: Minimum 1/4 inch, diamond-pattern plate reinforced with stiffeners as required to meet specified live load.
 - 9) Frame: 1/4-inch channel with anchor flange around perimeter.
 - 10) Hardware:
 - a) Hinges: Each leaf equipped with a minimum of 2 heavy forged-brass hinges with stainless steel pins.
 - b) Lock: Snap lock with removable handle mounted on door leaf.
 - c) Grip handle: Provide vinyl grip handle designed to release cover for closing.
 - d) Operating mechanism: Spring operators designed for ease of operation and automatic hold-open arm with release handle.
 - e) Drainage assembly: Provide 1-1/2-inch drainage coupling located in corner of the channel frame. Drain shall be routed outside of handhole.
 - c. Set direction of double leaf hinged hatches in lid in coordination with Owner requirements.
- E. Resilient pipe connectors:
1. Unless otherwise indicated on the Drawings or specified, provide a flexible compression type connector between manhole and pipes entering and leaving the manhole in accordance with ASTM C923.

2. Resilient pipe connectors:
 - a. Manufacturers: The following or equal.
 - 1) A-LOK Premium.
- F. Threaded lifting inserts.
- G. Drop manholes:
 1. Construct drop manholes as indicated on the Drawings.
 2. Provide inside diameter of drop inlet pipe the same as intercepted sewer unless otherwise indicated on the Drawings or specified in this Section.
 3. Furnish and set fittings as indicated on the Drawings.

2.08 IDENTIFICATION MARKINGS

- A. Stenciled in minimum 1-inch letters, on the interior and exterior of precast bases, risers, grade rings.
- B. Include the following information:
 1. Date of manufacturer of the item.
 2. Name or trademark of the manufacturer.
 3. Internal diameter in inches.
 4. Number of the manhole as indicated on the Drawings.

PART 3 EXECUTION

3.01 MANHOLE INSTALLATION

- A. Engineer may inspect manhole sections prior to installation.
- B. Manufacturer shall make available services of representative throughout the project duration when deemed necessary by the Engineer.
- C. Excavation and backfill as specified in Section 02318 - Trenching and as indicated on the Drawings.
- D. Install manholes as indicated on the Drawings.
- E. Maintain identifying markings (stamped or painted numberings, tags, etc.) on installed pieces throughout installation.
- F. Manhole sections placement:
 1. Set manhole sections to be vertical, with sections in true alignment.
 2. Cover the joint of the previously set section with joint sealant or joint lubricant to elastomeric seals before the next section is placed.
 3. Remove excess joint sealant prior to installation of grout to cover the joint.
- G. Construct invert channels, if applicable, to provide smooth flow transition waterway with no disruption of flow at pipe to manhole connections.
 1. Invert slope through manhole as indicated on the Drawings.

2. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.
 3. Polymer bench and channel, if applicable, are to be constructed with resin aggregate material - no alternative fill material is allowed.
 4. Do not use sections with chips or cracks in the joint.
 5. Install butyl mastic or elastomeric gasket material in accordance with manufacturer's instructions.
 6. Fill pick holes with grout.
 7. Completed manhole shall be rigid and watertight.
- H. Minimum clear distance between 2 wall penetrations:
1. Minimum of 6 inches on 48- to 72-inch diameter manholes.
 2. Minimum of 8 inches on larger diameter manhole.
- I. Minimum clear distance between wall penetration and joint.
1. Minimum of 3 inches.
- J. Complete pavement prior to setting existing and new manhole frames and covers to final grade, unless otherwise approved by the Engineer.
1. Install reinforced concrete manhole collars as indicated on the Drawings.
 2. Protect openings in manholes from construction loads, debris and unauthorized entry.
- K. Restore area disturbed by manhole installation including slope protection, re-vegetation, and road restoration.
- L. Repair of manhole sections damaged during installation in accordance with manufacturer's repair procedures and with the concurrence of the Engineer.
- M. Bedding and backfill for tee-base:
1. In accordance with pipe manufacturer's recommendations.
 2. Install such that the tee-base outlet is vertical and the upper end of the vertical pipe stub creates a horizontal plane.
- N. Cast tee bases in reinforced concrete as indicated on the Drawings.
1. Vibrate concrete and screed to place first precast polymer concrete manhole section level with uniform bearing for full circumference.
 2. Use steel impression ring to create a groove into which the first barrel section can be inserted.
 3. Install preformed plastic sealing gasket or butyl mastic and first manhole barrel section.
 4. Properly locate and plumb first section.
 5. Construct manhole bases as part of the pipe installation for the main alignment.
 - a. Fiberglass Reinforced Polymer Mortar Pipe (FRPMP): Provide a reinforced concrete encased tee base serving as the manhole base.
 - b. Small diameter sewers: Provide a manhole base of polymer concrete.
- O. Install joint sealant material in accordance with manufacturer's instructions.
1. Completed manhole shall be rigid and watertight.

- P. Lay grade rings in butyl mastic or plastic joint sealant with sides plumb and tops level.
 - 1. Maximum total height of grade rings: Not to exceed the limits as indicated on the Drawings.
- Q. Set frame and covers in accordance with Owner requirements and as indicated on the Drawings.

3.02 CLEANING

- A. After completing each manhole, remove debris, construction materials, and equipment from the site of the work, grade, and smooth over the surface and leave the entire right-of-way in a clean, neat, and serviceable condition.
- B. After completing each manhole, remove construction material debris from inside the manhole.

3.03 FUNCTIONAL TESTING

- A. Provide materials for grouting and patching recommended by the manufacturer or an approved equal.
 - 1. Polyester, vinyl ester, or epoxy resin mortar compound provided by the manufacturer.
- B. Vacuum testing in accordance with ASTM C1244.
 - 1. Install the vacuum test head on top of the manhole.
 - a. Install and brace sealing devices on influent and effluent pipes.
 - 2. Draw a vacuum of 10 inches of mercury with a vacuum pump, deactivate the pump, and measure the actual elapsed time for the vacuum to drop to 9 inches of mercury.
- C. Compare test results with the minimum time requirements stated in the table below:

<u>Minimum Time, Minutes: Seconds</u>				
Manhole Depth, feet.	Manhole Diameter, inches			
	36	48	60	72
8	0:14	0:20	0:26	0:33
10	0:18	0:25	0:33	0:41
12	0:21	0:30	0:39	0:49
14	0:25	0:35	0:46	0:57
16	0:28	0:40	0:52	1:07
18	0:32	0:45	0:59	1:13
20	0:35	0:50	1:05	1:21
22	0:38	0:55	1:12	1:29
24	0:42	0:59	1:18	1:37
26	0:46	1:04	1:25	1:45
28	0:49	1:09	1:31	1:53

<u>Minimum Time, Minutes: Seconds</u>				
Manhole Depth, feet.	Manhole Diameter, inches			
	36	48	60	72
30	0:53	1:14	1:38	2:01

1. If the time is less than the time in the table, the manhole is defective, and it shall be repaired and retested until it is acceptable.

END OF SECTION

SECTION 02621
STABILIZATION FABRIC

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Woven stabilization fabric used for subgrade enhancement.

1.02 REFERENCES

- A. ASTM International (ASTM):
1. D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 2. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 3. D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 4. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 5. D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 6. D6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

1.03 DEFINITIONS

- A. Stabilization Fabric: Woven geotextile fabric manufactured from polypropylene yarns.

1.04 SUBMITTALS

- A. Product data.
- B. Samples.
- C. Quality control submittals:
1. Certificates of Compliance.
 2. Manufacturer's Installation Instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection:
1. Furnish stabilization fabric in protective covers capable of protecting the fabric from ultraviolet rays, abrasion, and water.

1.06 PROJECT CONDITIONS

- A. Field measurements:
 - 1. Take field measurements to determine the exact lengths and dimensions of the surfaces to receive the fabric.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. One of the following or equal:
 - 1. Propex, Geotex 315ST.
 - 2. Ten Cate Geosynthetics, Mirafi 600X.

2.02 MATERIAL REQUIREMENTS

- A. Physical properties: Meet the following minimum requirements:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Verify that conditions are satisfactory for the installation of stabilization fabric.

3.02 PREPARATION

- A. Surface preparation: During grading operations, take care not to disturb the subgrade. This may require use of lightweight dozers for low strength soils such as saturated, cohesionless, or low cohesion soils.
- B. Prior to placement of fabric: Prepare surface to smooth condition free of debris, depressions, or obstructions that may damage the fabric.

3.03 INSTALLATION

- A. Follow manufacturer's installation instructions and as complimented in this Section.
- B. Place the stabilization fabric smoothly without folds or wrinkles.
- C. Use special care when placing the stabilization fabric in contact with the soil so that no void spaces occur between the stabilization fabric and the prepared surface.
- D. Overlap the parallel rolls and ends of rolls a minimum of 24 inches and not less than recommended by manufacturer.
- E. Do not drag stabilization fabric across subgrade.
- F. Make overlaps at ends of rolls in the direction of the aggregate placement with the previous roll on top.

- G. Use lightweight dozers, if necessary. Do not allow equipment directly on stabilization fabric.

3.04 FIELD QUALITY CONTROL

- A. Inspection: Before covering, the condition of the fabric will be observed by the Engineer to determine that no holes or rips exist in the fabric. Repair all holes or rips by placing a new layer of fabric extending beyond the defect in all directions, a distance equal to the minimum overlap required for adjacent rolls.

END OF SECTION

SECTION 02688

FIBERGLASS REINFORCED POLYMER MORTAR PIPE (FRPMP) FOR OPEN-CUT AND DIRECT JACKING/MICROTUNNELING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
1. Fiberglass reinforced polymer mortar pipe (FRPMP) and fittings.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
1. Standard Specifications for Highway Bridges.
- B. American Water Works Association (AWWA):
1. C950 - Standard for Fiberglass Pressure Pipe.
 2. M45 - Fiberglass Pipe Design - Third Edition.
- C. ASTM International (ASTM):
1. C33 - Standard Specification for Concrete Aggregates.
 2. D638 - Standard Test Methods for Tensile Properties of Plastics.
 3. D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 4. D2992 - Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings.
 5. D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
 6. D3681 - Standard Test Method for Chemical Resistance of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe in a Deflected Condition.
 7. D4161 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.
 8. D5262 - Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.
 9. F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- D. International Organization for Standardization (ISO):
1. 9001 - Quality Management Systems - Requirements.

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
1. Centrifugal casting: Process used to manufacture tubular goods by applying resin and reinforcement to the inside mold that is rotated and heated, subsequently polymerizing the resin system. Outside diameter of the finished

pipe is determined by the inside diameter (ID) of the mold tube. ID of the finished pipe is determined by the amount of material introduced into the mold. Other materials may be introduced in the process during manufacture of the pipe.

2. Fiberglass reinforced polymer mortar pipe (FRPMP): Pipe manufactured of polymer mortar with fiberglass reinforcement for strength. Pipe can be used for gravity or pressure applications dependent upon configuration of fiberglass reinforcement.
3. Filament wound: A process used to manufacture tubular goods by winding continuous glass-fiber roving or roving tape onto the outside of a mandrel or core pipe liner in a predetermined pattern under controlled tension. Roving may be saturated with liquid resin or pre-impregnated with partially cured resin. Subsequent polymerization of the resin system may require application of heat. Inside diameter of the finished pipe is fixed by the mandrel diameter or the inner diameter of the core pipe liner. Outside diameter of the finished pipe is determined by the amount of material that is wound on the mandrel or core pipe liner. Other materials may be introduced in the process during the manufacture of the pipe.
4. Liner: A filled or unfilled thermoplastic or thermosetting resin layer, nonreinforced or reinforced, forming the interior surface of the pipe.
5. Pipe stiffness number (SN): A measure of the force required to deflect the diameter of a pipe ring a unit amount.
6. Roving: A collection of parallel glass strands or filaments coated with a finish or coupling agent to improve compatibility with resins, gathered without mechanical twist. Roving may be processed in a continuous or chopped form.
7. Surface layer: A filled or unfilled resin layer, nonreinforced or reinforced, applied to the exterior surface of the pipe structural wall.

1.04 SUBMITTALS

- A. Furnish Submittals as specified in Section 01330 - Submittal Procedures.
- B. Product data.
- C. Shop Drawings:
 1. Catalog datasheets for all materials.
 2. Details of piping system components confirming that the pipe and fittings conform to the specified requirements.
 3. Fabrication drawings showing:
 - a. Wall thickness.
 - b. Pipe length.
 - c. Pipe joint.
 - d. Design of pipe and fittings.
 - e. Gasket details.
 4. Shop Drawings shall include fittings and specials that are to be installed.
 5. Pipeline layout and profile drawings showing location, station, and invert elevation of pipe sections, fittings, closure pieces and test closures.
 6. Test methods and results, including certification that pipe meets or exceeds the minimum requirements in accordance with AWWA C950, AWWA M45, ASTM D2412, ASTM D2992, and ASTM D3262, as appropriate.
 7. Testing equipment calibration certificate.

- D. Design calculations:
 - 1. Provided by a Professional Engineer licensed in the state where the Project is located to meet the following loadings:
 - a. In-situ.
 - b. Service.
 - c. Jacking pressure.
 - 2. Manufacturer shall verify that pipe stiffness provided meets conditions as specified in the Contract Documents.
 - 3. If computer calculations are used, include example calculations to show the logic employed.
- E. Manufacturer shall provide a certificate of compliance to these specifications referencing project name and location.
- F. Manufacturer's Certificate of ASTM Production Testing (Lot Certificates).
- G. Test reports:
 - 1. Provide valid current ASTM D3681 long-term strain corrosion and ASTM D4161 joint integrity qualification test reports.
 - 2. Provide ASTM D3681 Strain Corrosion test report verifying that the proposed FRPMP meets the long-term corrosion resistance required for Septic Sanitary Sewer service when tested using 1N Sulfuric Acid.
 - a. Test report and data shall be from sample production pipe from the plant, which will be supplying pipe to this Project.
 - b. Data from other manufacturing sites, or report with mix data are subject to rejection by the Owner.
- H. Manufacturer shall provide, as a Shop Drawing, recommendations for embedment, manhole connection details, encasement details, and any repair details.

1.05 GENERAL PIPING REQUIREMENTS

- A. As specified in Section 02001 - Common Work Results for General Piping.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. One of the following or equal:
 - 1. Future Pipe Industries.
 - 2. Hobas Pipe USA.
 - 3. Thompson Pipe Group.
- B. Current ISO 9001 certificate by an accredited third party auditing firm at the time of the bid and during construction period.

2.02 DESIGN CRITERIA

- A. Design calculations, detailing, and fabrication of FRPMP for the conveyance of raw sanitary sewage.

- B. Pipe design shall include the selection of external loads (dead and live loads), pressure class (PN), pipe stiffness class (SN) and other loads as determined by the Contractor.
- C. This Section covers the technical requirements for the installation of the fiberglass pipeline, fittings, and accessories.
- D. Contractor's Work shall include, but not necessarily be limited to, providing all items of labor, material, and equipment necessary to handle, install, and test the pipe, fittings, and accessories indicated on the Drawings.
- E. Other Work performed under this Section includes shop testing; fabrication of fittings and appurtenances; handling, storage and protection; and loading and transportation of completed fittings and appurtenances to the construction site.
- F. Manhole bases shall be constructed as part of the pipe installation.
 - 1. Manhole base: A tee riser serving as the base.
 - 2. Manufacturer shall:
 - a. Provide a sealed connection between the tee base and the riser, as indicated on the Drawings.
 - b. Coordinate with the pipe manufacturer for dimensions.

2.03 BASIS OF DESIGN

- A. Provide calculations for pipe structural design and pipe stiffness stamped by a Professional Engineer licensed in the state where the Project is located and verified by the pipe manufacturer in accordance with ASTM and AWWA standards based on the following design conditions gravity service:
 - 1. Size: Nominal diameter varies as indicated on the Drawings.
 - 2. Pipe Stiffness (SN): 72 lbf/in² minimum as indicated on the Drawings.
 - 3. Composite modulus of soil reaction: $E' = 1,500$ pounds per square inch (maximum value for design).
 - 4. Soil specific weight: $Y = 130$ lb/ft³.
 - 5. Dead load/depth of cover: As indicated on the Drawings. Vertical deflection not to exceed 3 percent in short term (30 days) and 5 percent thereafter.
 - 6. Live load: Equal to AASHTO Standard Specifications for Highway Bridges, HS-20 vehicle loading and including any construction live loads.
 - 7. Fluid temperature: 40 degrees Fahrenheit to 95 degrees Fahrenheit.
 - 8. Chemical resistance: FRPMP shall meet or exceed the requirement for the 50-year strain value in accordance with ASTM D3262, Table 4, when tested in accordance with ASTM D3681.
 - 9. Fluid velocity: 12 feet per second (maximum).
- B. Pipe manufacturer shall perform an analysis checking for possible flotation for water depths above the top of pipe of 2, 4, 6, 8, 10, and 12 feet.

2.04 MATERIALS

- A. Pipe and fittings:
1. Open-cut pipes for gravity service:
 - a. Manufactured and tested in accordance with ASTM D3262 Type 1, Liner 1 or 2, and Grade 1 or 3, with Pipe Stiffness Class SN 72 lbf/in² minimum as indicated on the Drawings. Stiffness shall be tested in accordance with the test method of ASTM D2412.
 - b. Manufactured to result in a dense, nonporous, corrosion-resistant, consistent composite structure.
 2. Resins, reinforcements, colorants, resin viscosity fillers, and other materials, when combined as a composite structure, shall produce a pipe that shall meet the performance requirements of this specification and applicable ASTM and AWWA standards.
 3. Basic structural wall composition of the pipe shall consist of a thermosetting resin, glass-fiber reinforcement, and premium silica sand aggregates.
 4. Manufacturer shall use polyester resin systems with a proven history of performance in this particular application. Historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
 5. Reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass or ECR-glass filaments with binder and sizing compatible with impregnating resins.
 6. Sand shall be minimum 98 percent silica with a maximum moisture content of 0.2 percent. Sand in accordance with ASTM C33, except that requirements for gradation shall not apply.
 7. Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product.
- B. Manufacture pipe by the centrifugal casting or continuous filament wound process to result in a dense, nonporous, corrosion-resistant, consistent composite structure.
1. For centrifugal casting and filament wound pipe, the interior surface liner shall provide chemical, crack and abrasion resistance and shall consist of nominal 40-mil (0.040-inch) thick layer.
 - a. For centrifugal casting, non-reinforced thermosetting polyester resin shall have a minimum elongation of 50 percent when tested in accordance with ASTM D638.
 - b. For filament wound, the liner shall be thermosetting polyester resin with glass reinforcements.
 2. If fiberglass C, E, or ECR-veil or equal reinforcements are placed, then the liner shall be minimum 40 mil (0.040 inch) measured from the inner glass-fiber reinforcement transition layer.
 - a. Thickness of the liner, defined as the final inner layer, shall not be used in structural calculations of the buried pipe loads.
 - b. Liner shall be color separated from the structural wall for QA/QC purposes by adding white, green, or gray die to the core of the pipe.
 - c. Color shall be approved by the Owner prior to pipe manufacturing.
 3. For centrifugally cast pipe, the exterior surface layer shall be at least 10 mils (0.010 inch) of a silica sand resin mixture over any fiber reinforcement.

4. For filament wound pipe, the exterior surface layer shall be at least 10 mils (0.010 inch) of resin fiberglass over reinforcements to allow for smooth surface finish and provide a long-term UV protection layer if pipe is stored for over 6 months.
- C. Outside diameter of the pipe shall be in accordance with ASTM D3262 (gravity service) or in accordance with the manufacturer's published product datasheet.
- D. Pipe shall be supplied in nominal lengths of 20 or 40 feet for open-cut installation with the exception of sections/fittings or direct jacked or microtunnel installation.
- E. For jacking pipe, the minimum wall thickness measured at the bottom of the spigot gasket groove where the wall cross-section has been reduced, is determined from the maximum jacking load. Minimum factor of safety against the jacking force is 2.5, based on a straight alignment.
- F. Transitions in pipe diameters:
 1. Internal diameters shall be smooth and transitional between different types of pipe, open-cut versus tunneling pipe, in accordance with ASTM D5262, Table 2.
 2. Where pipe cannot meet these requirements, install a 5 ply polyester laminate weld to span the internal diameter gap between differing pipe diameters.
- G. Squareness of jacking pipe ends: All points around each end of pipe unit shall fall within 1/4 inch or within 0.5 percent of the nominal diameter of the pipe, whichever is greater, to a plane perpendicular to the longitudinal axis of the pipe.
- H. Pipe shall be round and true with outside diameter tolerances in accordance with ASTM D3262 (gravity service).
 1. Internal diameter of any portion of each piece of pipe shall not vary more than plus or minus 1 percent, but in no case shall exceed 3/4 inch from the nominal diameter.
 2. Wall thickness shall not be more than 5 percent less than that shown in the design, but in no case more than 3/16 in less. A wall thickness greater than that required in the design shall not be cause for rejection.
- I. Each pipe shall be free from defects, including indentations, delaminations, bubbles, pinholes, visible cracks, pits, blisters, foreign inclusions, and resin-starved areas that due to their nature, degree, or extent, detrimentally affects the strength and serviceability of the pipe.
- J. Pipe shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.
- K. Inside surface of each pipe shall be free of bulges, dents, ridges, or other defects that result in a variation of inside diameter of more than 1/8 inches from that obtained on adjacent unaffected portions of the surface. No glass fiber reinforcement shall penetrate the interior surface of the pipe wall.
- L. Pipe specimens when tested in accordance with ASTM D3681 shall be capable of being deflected to 5 percent of the nominal diameter per size, without failure, and

demonstrate a minimum strain level (t/d) provided in Table 4 of ASTM D3262 (gravity service) when exposed to 1.0N sulfuric acid.

- M. Elastomeric gaskets shall be supplied by qualified gasket manufacturers and be suitable for raw wastewater service. Unless otherwise specified, the pipe joints shall be field connected with fiberglass sleeve couplings that utilize EPDM elastomeric sealing gaskets or Viton™/Nitril (for hydrocarbon exposure) in accordance with ASTM F477 as the sole means to maintain joint watertightness.
 - 1. Joints must meet the performance requirements in accordance with ASTM D4161.
 - 2. As part of Submittal, a certificate shall be issued by the pipe supplier that the EPDM and Viton™/Nitril gaskets meet the required ASTM standards and are covered under pipe warranty.
 - 3. Tie-ins, when needed, may utilize gasket-sealed mechanical couplings.
- N. Tees, wyes, and other fittings shall be capable of withstanding operating conditions when installed. They shall be manufactured from mitered sections of the same structural design as the adjoining pipe joined by glass-fiber-reinforced overlays.
- O. Fiberglass tees, wyes, or other similar fittings shall be fully encased in reinforced concrete designed to withstand the pressure forces.
- P. Unrestrained joints: Pipe shall be field connected with glass reinforced plastic sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water-tightness. Coupling joints shall meet the performance requirements in accordance with ASTM D4161 and ASTM F477 and shall have a deflection no greater than 75 percent of the manufacturer's recommendations.
- Q. Mark each length of pipe in accordance with ASTM D3262.

PART 3 EXECUTION

3.01 PIPELINE INSTALLATION AND TESTING

- A. Sewer pipe installation shall be in accordance with AWWA C950, AWWA M45, ASTM D2412, ASTM D2992, and ASTM D3262 as appropriate, as specified in this Section, and as indicated on the Drawings.

3.02 TRENCHING

- A. As specified in Section 02318 - Trenching.

END OF SECTION

SECTION 02707

HIGH DENSITY POLYETHYLENE (HDPE) PIPE: AWWA C906

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: High Density Polyethylene Pipe (HDPE), and fittings, 4-inch through 63-inch size.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C906 - Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution.
- B. ASTM International (ASTM):
 - 1. D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
 - 2. D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.
 - 3. D1599 - Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings.
 - 4. D1603 - Standard Test Method for Carbon Black Content in Olefin Plastics.
 - 5. D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
 - 6. D2290 - Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method.
 - 7. D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - 8. D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Material.
 - 9. F645 - Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems.
 - 10. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- C. International Organization of Standardization (ISO):
 - 1. 10863 - Non-destructive testing of welds - Ultrasonic testing - Use of time-of-flight diffraction technique (TOFD).
- D. Plastic Pipe Institute (PPI):
 - 1. PE 4710.

1.03 ABBREVIATIONS

- A. HDPE: High-density polyethylene.

- B. ID: Inside diameter of piping or tubing.
- C. OD: Outside diameter.
- D. SDR: Standard dimension ratio.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Shop drawings:
 - 1. Detailed layout drawings showing alignment of pipes, location of valves, fittings, and appurtenances, types of joints, and connections to pipelines or structures.
- C. Product data: As specified in Section 02001 - Common Work Results for General Piping:
 - 1. Describe materials and installation equipment including fusion machine.
 - a. Include optimum range of fusion conditions such as fusion temperature, interface pressure, and cooling time.
 - 2. Pipe loads and structural calculations.
 - 3. Installation instructions.
- D. Qualifications of installation crew for high-density polyethylene pipe including qualifications of the fusion machine technician. Furnish proof of training in the use of fusion equipment.

1.05 QUALITY ASSURANCE

- A. Markings on the pipe shall be in accordance with AWWA C906.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect piping materials from sunlight, scoring, and distortion.
- B. Do not allow surface temperatures on pipe and fittings to exceed 120 degrees Fahrenheit.
- C. Store and handle HDPE pipe and fittings as recommended by manufacturer in published instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. In accordance with AWWA C906.

2.02 MATERIALS

- A. Fittings: Same material as the pipe and of equal or greater pressure rating.

2.03 HDPE PIPING

A. General:

1. Pipe and fittings: High-density polyethylene.
2. Dimensions of pipe and fittings: Based on controlled outside diameter in accordance with ASTM F714:
 - a. SDR: As given in Piping Schedule as indicated on the Drawings.
 - b. Pipe Diameter: IPS dimensions as indicated on the Drawings.
3. Pipe, fittings, and adapters: Furnished by the same manufacturer, or compatible with components in the same system and with components of other systems to which connected.

B. Materials:

1. Manufacturers: One of the following or equal:
 - a. Performance Pipe (Chevron Phillips Chemical Company): DriscoPlex 4000/4100 Series.
 - b. ISCO Industries.
2. Polyethylene: As listed by the PPI under the designation PE 4710; and have a minimum cell classification, in accordance with ASTM D3350, of 445574C:
 - a. Pipe and fittings: Manufactured from material with the same cell classification.
 - b. Manufacturer shall certify that pipe and fittings meet the above classifications.
3. Polyethylene fittings and custom fabrications:
 - a. Molded or fabricated.
 - b. Butt fusion outlets shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe.
 - c. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe.
 - d. Pressure de-rated fabricated fittings are prohibited.
4. Molded fittings:
 - a. Manufactured in accordance with ASTM D3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing, and shall be so marked.
 - b. Each production lot of molded fittings shall be subjected to the tests required under ASTM D3261.
5. X-ray inspection: The Manufacturer shall submit samples from each molded fittings production lot to x-ray inspection for voids, and shall certify that voids were not found.
6. Fabricated fittings:
 - a. Made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings.
 - b. Rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.
7. Polyethylene flange adapters:
 - a. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder.
 - b. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves to provide gasketless sealing, or to restrain the gasket against blowout.

8. Back-up rings and flange bolts:
 - a. Flange adapters shall be fitted with Type 316 stainless steel back-up rings pressure rated equal to or greater than the mating pipe.
 - 1) Back-up rings shall be convoluted style for 150-pound bolt hole pattern.
 - b. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius.
 - c. Flange bolts and nuts shall be the same material as backing flange

2.04 SOURCE QUALITY CONTROL

- A. HDPE piping:
 1. Manufacturer's quality control: The pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials.
 2. Incoming polyethylene materials:
 - a. Inspected for density, melt flow rate, and contamination.
 - b. The cell classification properties of the material shall be certified by the supplier and verified by manufacturer's quality control.
 - c. Approved by quality control before processing into finished goods.
 3. Outgoing materials shall be checked for:
 - a. Outside diameter, wall thickness, and eccentricity in accordance with ASTM D2122 at a frequency of at least once per hour.
 - b. Out of roundness at a frequency of at least once per hour.
 - c. Straightness, inside and outside surface finish, markings and end cuts shall be visually inspected in accordance with ASTM F714 on every length of pipe:
 - 1) Quality control shall verify production checks and test for:
 - a) Density in accordance with ASTM D1505 at a frequency of at least once per extrusion lot.
 - b) Melt Index in accordance with ASTM D1238 at a frequency of at least once per extrusion lot.
 - c) Carbon content in accordance with ASTM D1603 at a frequency of at least once per day in accordance with extrusion line.
 - d) Quick burst pressure in accordance with ASTM D1599 at a frequency of at least once per day per line.
 - e) Ring Tensile Strength in accordance with ASTM D2290 at a frequency of at least once per day per line.
 - d. X-ray inspection shall be used to inspect molded fittings for voids, and knit line strength shall be tested. All fabricated fittings shall be inspected for joint quality and alignment.
 4. Permanent records: The manufacturer shall maintain permanent QC and QA records.
 5. Compliance tests:
 - a. Manufacturer's inspection and testing of the materials.
 - 1) In case of conflict with manufacturer's certifications, the Contractor, Engineer, or Owner may request retesting by the manufacturer or have retests performed by an outside testing service.
 - 2) All retesting shall be at the requestor's expense and shall be performed in accordance with this Section.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Where not otherwise specified, install piping in accordance with ASTM F645, or manufacturer's published instructions for installation of piping, as applicable to the particular type of piping.
2. Provide molded transition fittings for transitions from HDPE to metal or IPS pipe. Do not thread or solvent weld HDPE pipe.

B. Installation of HDPE piping:

1. Joining:

a. Heat fusion joining:

- 1) Joints between plain end pipes and fittings shall be made by butt fusion, and joints between the main and saddle branch fittings shall be made utilizing saddle fusion employing only procedures that are recommended by the pipe and fitting manufacturer.
- 2) The Contractor shall certify, in writing, that persons making heat fusion joints have received training in the manufacturer's recommended procedure and have had at least 3 years current experience in the heat fusion butt welding process.
- 3) The Contractor shall maintain records of trained personnel and shall certify that training was received not more than 12 months before commencing construction.
- 4) External and internal beads shall not be removed.

b. Heat fusion training services: The manufacturer shall provide training in the manufacturer's recommended butt fusion and saddle fusion procedures to the Contractor's installation personnel, and to the inspector(s) representing the Owner, prior to the start of construction.

c. Mechanical joining:

- 1) Unless otherwise indicated on the Piping Schedule, HDPE pipe and fittings may be joined together or to other materials by means of flanged connections (flange adapters and back-up rings) or, where specifically indicated on the Drawings, flexible couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material.
- 2) Flexible couplings shall be fully pressure rated and fully thrust restrained such that when installed in accordance with manufacturer's recommendations, a longitudinal load applied to the mechanical coupling will cause the pipe to yield before the mechanical coupling disjoins.

2. Installation:

a. General:

- 1) The Manufacturer shall package products for shipment in a manner suitable for safe transport by commercial carrier.
- 2) When delivered, a receiving inspection shall be performed, and any shipping damage shall be reported to the Manufacturer within 7 days.
- 3) Damaged pipe shall be promptly removed from the job site.
- 4) Installation shall be in accordance with Manufacturer's recommendations, and this specification.

- 5) Prior to making a terminal connection of each individual run of HDPE pipe, the temperature of the pipe should be allowed to approach the service temperature at which the pipe is intended to operate.
- 6) All necessary precautions shall be taken to ensure a safe working environment in accordance with applicable codes and standards.
- b. Large diameter fabricated fittings: Fabricated fittings shall be butt fused to the end of a pipe.
- c. Mechanical joint and flange installation:
 - 1) Mechanical joints and flange connections shall be installed in accordance with the manufacturer's recommended procedure.
 - 2) Flange faces shall be centered and aligned to each other before assembling and tightening bolts.
 - 3) Every effort shall be made to ensure that the opposing faces of the flange assemblies mate up securely at a temperature approximately the same as the service temperature.
 - 4) In no case shall the flange bolts be used to draw the flanges into alignment.
 - 5) Bolt threads shall be lubricated, and flat washers shall be fitted under the flange nuts.
 - 6) Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the manufacturer.
 - 7) At least 1 hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the manufacturer.
 - 8) The final tightening torque shall be 100 feet-pounds or less as recommended by the manufacturer.
- d. Pipe handling:
 - 1) Lift, move, or lower pipe and fittings only with wide fabric choker slings.
 - 2) Wire rope or chain shall not be used.
 - 3) Slings shall be of sufficient capacity for the load, and shall be inspected before use.
 - 4) Worn or defective equipment shall not be used.
- e. Excavation, backfill material and backfilling and compacting:

3.02 FIELD QUALITY CONTROL

- A. Butt fusion testing on pipe size 14 inches and larger:
 1. The first fusion of each day shall be a trial fusion.
 - a. The trial fusion shall be allowed to cool completely.
 - b. Fusion test straps shall be cut out.
 - 1) The test strap shall be 12 inches (minimum) or 30 times the wall thickness in length with the fusion in the center, and 1 inch (minimum) or 1.5 times the wall thickness in width.
 - c. Bend the test strap until the ends of the strap touch.
 2. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested.
 3. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.

- B. Data logging and test data:
 - 1. A data logger shall be installed on the fusion heated joining machine. Data on each joint shall be recorded by the data logger. Data to be recorded shall be minimum temperature of joint fusion and interface pressure of the fused joint.
 - 2. Recorded data from the fusion data logger and the TOFD shall be transmitted to the Owner daily.

- C. Pressure testing:
 - 1. Test pressures as specified in the Piping Schedule
 - 2. Temperature of test water shall be no more than 73 degrees Fahrenheit.

END OF SECTION

SECTION 02939

SEEDING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Seeding.

1.02 REFERENCES

- A. Association of Official Seed Analysts (AOSA).
- B. United States Department of Agriculture (USDA).
- C. United States Environment Protection Agency (EPA).

1.03 TERMINOLOGY

- A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.
 - 1. Duff layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
 - 2. Finish grade: Elevation of finished surface of planting soil.
 - 3. Manufactured topsoil: Soil produced off site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
 - 4. Planting soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
 - 5. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
 - 6. Surface soil: Soil that is present at the top layer of the existing soil profile at the Project Site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.04 SUBMITTALS

- A. Furnish Submittals as specified in Section 01330 - Submittal Procedures.
- B. Certification of grass seed:
 - 1. From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

2. Certification and inspection as required by governmental authorities of each seed mixture. Include identification of source and name and telephone number of supplier.
- C. Qualification data: For qualified landscape installer.
- D. Samples: Imported topsoil, organic matter.
- E. Product certificates.
- F. Maintenance instructions:
1. Recommended procedures for the maintenance of turf and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

1.05 QUALITY ASSURANCE

- A. Soil analysis:
1. For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil. Refer to plan notes for number and location of soil analysis tests.
 2. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 3. Soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken in accordance with instructions from the Engineer.
 - a. A minimum of 3 representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 4. Report suitability of tested soil for turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated.
 - 1) State recommendations in weight per 1,000 square feet or volume per cubic yard for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Seed and other packaged materials:
1. Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
 2. Protect seed during delivery and storage.
 3. Seed that has become wet or otherwise damaged will not be acceptable.

- B. Deliver packaged materials in waterproof bags showing weight, chemical analysis, and name or trademark of manufacturer.
 - 1. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, percentage of purity (PLS), percentage of germination and location of packaging.
- C. Local sourcing of seed not in sealed containers is permitted for smaller projects.
- D. Label seed bags per variety.
- E. Store materials in protected and covered storage until application or use.
- F. Bulk materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- G. Truck receipts: For verification of soil amendments and imported topsoil.

1.07 WARRANTY

- A. Guarantee seeding to be alive and healthy for 3 years following date of final completion by the Engineer.
- B. Seeded areas shall have an even stand of grass with germination over 100 percent of the Site within 45 days of seeding.
- C. Seeded grass areas are to be ensured of obtaining a satisfactory stand of growth.
- D. Total area occupied by bare spots larger than 0.25 square feet must not exceed 10 percent of the total seeded area.
- E. Maximum single bare spot size of irrigated seed 3 inches by 3 inches.
- F. Maximum single bare spot size of non-irrigated seed is 1 square foot.
- G. Seeded grass areas which do not meet the satisfactory stand of growth qualification shall be reseeded and mulched.
- H. Replace seeding when it is no longer in a satisfactory condition or do not meet the preceding standard as determined by the Engineer or the duration of the guarantee/warranty period.
 - 1. Make replacements as soon as possible within the recommended seeding schedule.

- I. Replacements:
 1. Seed of same mix, quality and species as originally specified, as soon as possible within the recommended seeding schedule, with a new 1-year warranty commencing on date of replacement.
 2. Repairs and replacements shall be made at no expense to the Owner.

PART 2 PRODUCTS

2.01 STAKES

- A. Softwood lumber, chisel pointed.

2.02 WATER

- A. Use potable water for making up seed mixture.

2.03 SOILS

- A. Topsoil:
 1. Fertile soil, typical for locality, capable of sustaining vigorous plant growth.
 2. Taken from existing riverbank soil
 3. Free of subsoil, stones more than 1 inch in diameter, clay clumps, or impurities, plants weeds and roots.
 4. Organic content:
 - a. Minimum 2 percent by mass.
 5. pH value:
 - a. Minimum: 5.5.
 - b. Maximum: 7.5.

2.04 SEED

A. Provide seed mix as shown in Table A for restoration of the Weber riverbanks:

Table A: Seed Mix									
Common Name	Scientific Name	Type	Wetland Status	Target Density	Seeds per pound	Required Seeds (lbs/acre)	Purity Rate (%)	Germination Rate (%)	PLS (lbs/acre)
Cluster Field Sedge	<i>Carex praegegracilis</i>	Sedge	Facultative Wetland	1,200,000	150,000	8.00	100	80	6.4
Arctic Rush	<i>Juncus arcticus</i>	Rush	Obligate Wetland	1,600,000	150,000	10.67	100	80	8.5
Basin Wildrye	<i>Leymus cinereus</i>	Grass	Facultative Wetland	800,000	60,000	13.33	100	80	10.7
Western Wheatgrass	<i>Pascopyrum smithii</i>	Grass	Facultative Wetland	800,000	80,000	10.00	100	80	8.0
Saltgrass	<i>Distichlis spicata</i>	Grass	Obligate Wetland	480,000	300,000	1.6	100	80	1.3
Field Horsetail	<i>Equisetum arvense</i>	Forb	Obligate Wetland	400,000	1,000,000	0.40	100	80	0.3
Gooseberryleaf Globemallow	<i>Sphaeralce grossulariifolia</i>	Forb	Facultative Wetland	320,000	150,000	2.13	100	80	1.7
Silverweed Cinquefoil	<i>Argentina anserina</i>	Forb	Facultative Wetland	160,000	150,000	1.07	100	80	0.9
Live Stakes									
Narrowleaf Willow	<i>Salix exigua</i>	Shrub	Obligate Wetland						

- B. Packaging: Provide separate bags or containers for each variety of seed.
- C. Plant seed that is appropriate for planting season.
- D. Provide seed from tested lots and delivered to the Project Site in standard containers labeled as required by USDA regulations and applicable state regulations.
- E. Use labels that show variety of strain of seed, degree of purity (percent), rate of germination (percent), weed content (percent), and date of test.
- F. Grass seed:
 - 1. Fresh, clean, dry, new crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
 - 2. Species: Match existing grass type.
 - 3. Seed mixture:
 - a. Germination minimum: 95 percent.
 - b. Pure seed minimum: 85 percent.
 - c. Weed seed maximum: 0.5 percent.
 - d. Other than grass seed, non-viable seed, chaff, hulls, live seed of crop plants (other than those specified), harmless inert matter, and maximum: 18 percent.

2.05 SITE CONDITIONS

- A. Planting restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date.
 - 1. Riverbank seed areas: Seed during periods of lower runoff such as late fall or early spring, before peak runoff occurs.
- B. Coordinate with the Contractor's work requiring access to Site over existing vegetation areas.
 - 1. No trucking or moving of equipment or materials shall be permitted over completed seed areas.
- C. Weather limitations:
 - 1. Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained.
 - 2. Apply products during favorable weather conditions according to the manufacturer's written instructions.

2.06 EXISTING VEGETATION RENOVATION

- A. Renovate existing vegetation damaged by the Contractor's operations.
 - 1. Reestablish vegetation where settlement or washouts occur or where minor regrading is required.
 - 2. Install topsoil as required.
- B. Remove sod and vegetation from diseased or unsatisfactory vegetation areas; do not bury in soil.

- C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from the Contractor's operations, and replace with new planting soil.
- D. Mow, dethatch, core aerate, and rake existing vegetation.
- E. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off the Owner's property.
- F. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- G. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil.
 - 1. Install new planting soil to fill low spots and meet finish grades.
- H. Water newly planted areas and keep moist until new turf is established.

2.07 PREPARATION

- A. Prior to seeding, irrigate for a minimum of 2 weeks to allow germination of weed seeds.
- B. Biodegradable Mats: Use jute or coir mats to provide temporary protection against erosion while allowing seed germination. Ensure the mat is anchored down to prevent movement. Place mat over seeded areas.
- C. Protect existing and new structures, fences, utilities, sidewalks, paving, curbs, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- D. Limit turf subgrade preparation to areas to be planted.
- E. Newly graded subgrades:
 - 1. Loosen/scarify subgrade to a minimum depth of 6 inches.
 - 2. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter, and legally dispose of them off the Owner's property.
 - 3. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted the subgrade.
 - 4. Tolerances: Top of subgrade, within 1 inch.
- F. Prepare subgrade and eliminate uneven areas and low spots.
 - 1. Maintain lines, levels, profiles and contours.
 - 2. Make changes in grade gradual. Blend slopes into level areas.
- G. Do not prepare subgrade in areas of on-site plant preservation.
- H. Do not bury foreign material beneath areas to be seeded.

- I. Remove any contaminated subgrade.
 - 1. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
 - b. Reduce elevation of planting soil to allow for soil thickness of sod.
- J. Unchanged subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf.
 - a. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 6 inches.
 - a. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil.
 - b. Apply superphosphate fertilizer directly to surface soil before loosening.
 - 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including contaminated soils, grass, vegetation, and turf, off the Owner's property.
- K. Finish grading:
 - 1. Grade seeding areas to a smooth, uniform surface plane with loose, uniformly fine texture.
 - 2. Grade to within 1/2 inch of finish elevation.
 - 3. Roll and rake, remove ridges, fill depressions to meet finish grades, and ensure positive surface drainage.
 - 4. Maintain profiles and contour of subgrade.
 - 5. Limit finish grading to areas that can be planted in the immediate future.
- L. Rip topsoil that has been spread to a minimum depth of 8 inches in one direction using an agricultural ripper with tines spaced at no greater than 18 inches.
 - 1. Areas adjacent to walks, structures, curbs, etc., where the use of large mechanical equipment is difficult, shall be worked with smaller equipment or by hand.
- M. Manually spread topsoil close to plant materials and structures to prevent damage.
- N. Spread amendments, as determined by the soil test results or indicated on the Drawings, over the entire area to be seeded and incorporate into the top 6 inches of soil by disking or rototilling until a uniform mixture is obtained with no pockets of soil or amendments remaining.
- O. Restore fine grade with float drag to remove irregularities resulting from tilling operations.
 - 1. Float drag or rake in 2 directions.
 - 2. Remove any additional stones over 1 inch that have come to the surface.
 - 3. Perform drainage test by applying water with the irrigation system.
 - 4. Do not plant until the finished grade is reviewed by the Engineer.

5. This review does not reduce the Contractor's responsibility to provide a finished product that drains.
- P. Remove any additional stones over 1 inch that have come to the surface.
- Q. Moisten prepared area before planting if soil is dry.
 1. Water thoroughly and allow surface to dry before planting.
 2. Do not create muddy soil.
- R. Before planting, obtain the Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- S. Tolerances: Top of topsoil within 1/2 inch.

2.08 SEED AND PLANTING

- A. Higher seed density:
 1. Use a higher seeding rate to compensate for potential washout, ensuring enough plants, establish despite some loss.
- B. Willow live stakes:
 1. Harvest cutting while plants are dormant, prepare cutting/soils. Plant cutting every 3 to 5 feet, 18 to 24 inches deep, water if needed, use biodegradable mats. Plants to be placed closer together depending on desired density, erosion control and habitat intentions
- C. Hand or roller seeding:
 1. Seed at the rates specified below.
 2. Seed in 2 passes at right angles to one another.
 3. Sow half the seed in each pass.
 4. Provide markers or other means to ensure that the successive seeded strips will overlap or be separated by a space no greater than the space between the rows planted by the equipment being used.
 5. Do not seed during windy weather.
 6. Restore fine grade after seeding as requested by the Engineer.
 7. Remove irregularities by hand raking or rolling.
 8. In areas inaccessible to a drill seeder, broadcast seed by hand in 2 opposite directions.
 - a. Rake in seed after broadcasting.
 - b. Do not broadcast seed during windy weather.
 9. Seeding rates:
 - a. Shall be as recommended by the seed supplier for drill seeded areas.
 - b. Hand and broadcast seeded areas shall receive 2 times the seeding rate indicated.
 10. Do not sow immediately following rain, when ground is too dry, frozen, or during windy periods.
 11. Roll seeded area with roller not exceeding 100 pounds.
 12. Immediately following seeding and compacting, apply mulch.
 13. Sow seed at a total rate as recommended by the seed supplier.
 14. For any broadcast seeded areas, rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

15. Protect seeded areas with erosion-control mats; install and anchor according to the manufacturer's written instructions.
 16. In final preparations for seeding, use level board not less than 8 feet in length to ensure true and accurate grades.
 17. Finish grade lawn areas to 2-inches below elevation of adjacent paving.
 18. Do not take heavy objects, except lawn rollers, over areas that have been prepared for seeding.
 19. Prior to seeding, the Engineer shall accept areas for grade and compaction.
- D. Seed establishment on slopes of riverbanks:
1. Biodegradable Mats: Use jute or coir mats to provide temporary protection against erosion while allowing seed germination. Ensure the mat is anchored down to prevent movement. Place mat over seeded areas.
 2. Roll fabric onto slopes without stretching or pulling.
 3. Lightly dress slopes with topsoil to ensure close contact between mats and soil.
 4. For sides of ditches, lay fabric laps in direction of water flow.
 - a. Lap ends and edges minimum 6 inches.
 5. Contour Planting
 - a. If applicable, seed along the contours of the bank to follow the natural flow of water and reduce erosion
- E. Satisfactory seed areas:
1. Seeding installations shall meet the following criteria as determined by the Engineer:
 - a. Acceptance for soil preparation (topsoil installation) and final grading shall be given by the Engineer upon satisfactory completion of each section or area prior to seeding.
 - b. Final completion for seeded areas shall be given by the Engineer as soon as there is an even stand of grass with germination over 100 percent of the Site.
 - 1) Warranty:
 - a) Guarantee seeding to be alive and healthy for 3 years following date of final completion by the Engineer.
 - b) Seeded areas shall have an even stand of grass with germination, over 100 percent of the Site within 45 days of seeding.
 - c) Seeded grass areas are to be ensured of obtaining a satisfactory stand of growth.
 - d) Total area occupied by bare spots larger than 0.25 square feet must not exceed 10 percent of the total seeded area.
 - e) Maximum single bare spot size of irrigated seed 3 inches by 3 inches.
 - f) Maximum single bare spot size of non-irrigated seed is 1 square foot.
 - g) Seeded grass areas which do not meet the satisfactory stand of growth qualification shall be reseeded and mulched.
 - 2) Re-seed areas that, in the opinion of the Engineer, do not meet the preceding standards.
 2. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

- F. Seeded area maintenance:
1. Maintain and establish seeded area by watering, noxious weed management, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable seeded area.
 - a. Roll, regrade, and replant bare or eroded areas and remulch.
 - b. Provide materials and installation the same as those used in the original installation.
 - 1) Fill in as necessary soil subsidence that may occur because of settling or other processes.
 - a) Replace materials and seeded area damaged or lost in areas of subsidence.
 - 2) In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3) Apply treatments as required to keep seeded area and soil free of pests and pathogens or disease.
 - a) Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
 2. Watering: Install and maintain temporary piping, hoses, and seeded area watering equipment to convey water from sources and to keep meadow uniformly moist.
 - a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
 - 1) Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - b. Water meadow with fine spray at a minimum rate of 1/2 inch per week or more for seed establishment for 6 weeks after planting or until seed establishment is determined by the Engineer (whichever is longer) unless rainfall precipitation is adequate.

2.09 EROSION CONTROL BLANKETS

- A. Preparation for erosion-control materials:
1. Install erosion-control materials in accordance with the manufacturers' recommendations.
 2. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by the material manufacturer for Site conditions.
 - a. Fasten as recommended by the material manufacturer.
 3. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 4. Moisten prepared area before planting if surface is dry.
 5. Water thoroughly and allow surface to dry before planting.
 6. Do not create muddy soil.

2.10 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas.
1. Clean wheels of vehicles before leaving the Site to avoid tracking soil onto roads, walks, or other paved areas.

- B. Erect temporary fencing or barricades and warning signs as required to protect newly seeded areas from traffic.
 - 1. Maintain fencing and barricades throughout initial seed establishment.
- C. Remove nondegradable erosion-control measures after grass establishment period.
- D. During landscape installation:
 - 1. Areas shall be reasonably clean at the end of each workday.
 - 2. Sidewalks and other paved areas shall be swept or washed down as needed.
- E. Project completion:
 - 1. Debris, soil, and trash resulting from landscape operations shall be removed from the Site.
 - 2. Paved areas shall be washed down.

END OF SECTION

SECTION 03154

HYDROPHILIC RUBBER WATERSTOP

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Hydrophilic rubber waterstop.

1.02 SUBMITTALS

- A. General:
1. Submit the following items for each type, style and size of hydrophilic waterstop to be installed.
 2. Product data:
 - a. Manufacturer's product data sheets.
 - 1) Include complete physical dimensions, expansion characteristics, and laboratory test reports indicating that average material properties conform to the requirements specified.
 - 2) Provide data sheets for all materials to be included in the waterstop system.
 3. Samples:
 - a. Minimum 6-inch long samples of each type of waterstop to be used if requested by the Engineer.
 4. Manufacturer's installation instructions:
 - a. Installation instructions and recommended installation details for the complete waterstop system, and for each component used in that system.

PART 2 PRODUCTS

2.01 HYDROPHILIC RUBBER WATERSTOP

- A. General:
1. System composed of flexible hydrophilic urethane polymer with preformed strips, adhesives, paste, fasteners, and other accessories required for a complete and watertight installation.
 - a. To ensure compatibility of materials, a single manufacturer shall provide all products and accessories for the hydrophilic waterstop system.
 - b. Products incorporating bentonite are not acceptable under this Section.
 - c. Provide waterstop and accessories resistant to degradation under cyclic wetting and drying.

- B. Hydrophilic strip waterstop:
 - 1. Pre-formed strips of flexible hydrophilic rubber designed to undergo controlled expansion when exposed to moisture:
 - a. Strips manufactured to limit expansion in directions parallel to the plane of the joint, and to direct expansion against confining material perpendicular to that plane.
 - 2. Provide normal or low-expansion pressure as scheduled and as indicated on the Drawings.
 - 3. Manufacturers: One of the following or equal:
 - a. Hydrophilic strip:
 - 1) Adeka Ultra Seal USA, MC-2010MN.
 - 2) Sika Corp., Hydrotite CJ1020-2K.
 - b. Low expansion hydrophilic strip:
 - 1) Adeka Ultra Seal USA, KBA-1510FP.
 - 2) Sika Corp., Hydrotite CJ0725-3K.
- C. Hydrophilic paste waterstop.
 - 1. Single-component gun grade paste of hydrophilic rubber designed to undergo controlled expansion when exposed to moisture after initial curing.
 - 2. Manufacturers: One of the following or equal:
 - a. Adeka Ultra Seal USA: P-201.
 - b. Sika Corp., Leakmaster LV-Z.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and recommended details.
- B. Prepare concrete joint surfaces:
 - 1. Use wire brushing or scraping to expose an uncontaminated, solid surface.
 - 2. Clean prepared surface with high-pressure air or water to remove residue and debris.
 - 3. Confirm that prepared surfaces conform to manufacturer's recommendations for surface profile and moisture conditions before installing materials.
- C. Provide manufacturer's recommended lap, splice, and corner details for hydrophilic waterstops.
 - 1. Use hydrophilic paste at all corner joints and overlap splices of hydrophilic strips.
- D. Hydrophilic strip waterstop:
 - 1. Install primers and adhesives when recommended by the manufacturer before setting hydrophilic strips.
 - 2. Keep hydrophilic strip taut during the fastening process.
 - 3. Secure hydrophilic strip in place with concrete nails, screws, or adhesive.

4. Provide installation with no gap between the hydrophilic strip and the concrete to which it is attached. At rough or irregular surfaces, set hydrophilic strip waterstop strip in a bead of hydrophilic paste.
 - a. Fill all voids and rough areas under the hydrophilic strip with hydrophilic paste.
 - b. Allow hydrophilic paste to cure in accordance with manufacturer's recommendations before encapsulating paste in fresh concrete.

3.02 SCHEDULE

- A. At the following joint locations/conditions, use the hydrophilic strip waterstop configuration noted unless otherwise indicated on the Drawings.
- B. Concrete construction joints:
 1. Under all of the following conditions, use hydrophilic strip waterstop set in a bed of hydrophilic paste waterstop, and screw strip waterstop to concrete surface:
 - a. Slab or wall thickness is greater than 10 inches.
 - b. Waterstop is placed between 2 rows of steel reinforcement.
 - c. Concrete cover from waterstop to nearest concrete face is at least 4 inches.
 2. Under any one of the following conditions, use low-expansion hydrophilic strip waterstop set in bed of hydrophilic paste waterstop and screw strip to concrete surface:
 - a. Waterstop is placed on 1 side of a single row of steel reinforcement.
 - b. Concrete cover from waterstop to nearest concrete face is less than 4 inches.
- C. Pipe penetrations through concrete:
 1. Pipe diameter less than 4 inches: Not allowed.
 2. Pipe diameter of 4 to 24 inches: Continuous bead of hydrophilic paste waterstop, minimum 1/4-inch high by 1/2-inch wide, encircling pipe.
 3. Pipe diameter greater than 24 inches: Continuous hydrophilic strip waterstop around perimeter of pipe, with hydrophilic paste seal at lapped ends of strip.

END OF SECTION

SECTION 03301

CONCRETE WORK

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PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Concrete formwork, concrete accessories, concrete reinforcement, batching and mixing of concrete to be cast-in-place, concrete placement and curing, and tooled concrete finishes.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. CODE-318 - Building Code Requirements for Structural Concrete and Commentary.
 - 2. MNL-66 - ACI Detailing Manual.
 - 3. PRC-305 - Specification for Hot Weather Concreting.
 - 4. PRC-306 - Standard Specification for Cold Weather Concreting.
 - 5. SPEC-117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 6. SPEC-301 - Specifications for Concrete Construction.
- B. ASTM International (ASTM):
 - 1. A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 2. A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - 3. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 4. C33 - Standard Specification for Concrete Aggregates.
 - 5. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 6. C94 - Standard Specification for Ready-Mixed Concrete.
 - 7. C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - 8. C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - 9. C150 - Standard Specification for Portland Cement.
 - 10. C156 - Standard Test Method for Water Loss from a Mortar Specimen Through Liquid Membrane-Forming Curing Compounds for Concrete.
 - 11. C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 12. C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 13. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - 14. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 15. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 16. C311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.
 - 17. C494 - Standard Specification for Chemical Admixtures for Concrete.
 - 18. C595 - Standard Specification for Blended Hydraulic Cements.
 - 19. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

20. C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
21. C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
22. C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
23. C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
24. C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
25. C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete.
26. D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
27. D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
28. D2103 - Standard Specification for Polyethylene Film and Sheeting.

- C. Concrete Reinforcing Steel Institute (CRSI):
1. Manual of Standard Practice.

1.03 TERMINOLOGY

- A. The words and terms listed below, are not defined terms that require initial capital letters, but, when used in this Section have the indicated meaning.
1. Alkali load: Amount of alkalis contributed by the cement in a concrete mixture, expressed in lb/yd³, and calculated by multiplying the cement content of the concrete in lb/yd³ by the alkali content of the Portland cement; or the Portland cement portion of a blended cement, divided by 100.
 2. Average daily temperature: Average of the highest and lowest temperatures during a 24-hour period from midnight to midnight.
 3. Cementitious materials: Portland cement or blended cement and supplementary cementitious materials.
 4. Cold weather: A period when, for more than 3 consecutive days, the average daily temperature drops below 40 degrees Fahrenheit.
 - a. When the temperature is above 50 degrees Fahrenheit for more than half of any 24-hour duration, that period need not be regarded as cold weather.
 5. Green concrete: Concrete whose current compressive strength is less than 100 percent of the minimum specified compressive strength, f'c.
 6. Hand mixed concrete: Concrete mixed at or near the point of placement using shovels, hoes, or other similar manually operated tools.
 7. Hot weather: A period when project conditions such as low humidity, high temperature, solar radiation, and high winds promote rapid drying of freshly placed concrete.
 8. Neat cement grout: Grout made from a mixture of Portland cement and water.
 9. Supplementary cementitious material: Inorganic material such as fly ash, natural pozzolans, silica fume, or slag cement that reacts pozzolanically or hydraulically.

1.04 SUBMITTALS

- A. Furnish Submittals as specified in Section 01330 - Submittal Procedures.
- B. Product data:
 - 1. Formwork:
 - a. Formwork facing materials. Data on facing materials for concrete exposed to view in the finished work, if different from that specified in this Section.
 - b. Form release agent. Manufacturer's name and catalog data, including materials safety datasheet and documentation of suitability for use in contact with potable water.
 - 2. Joint materials:
 - a. Preformed expansion joint material: Manufacturer's name and catalog data with documentation of conformance to materials standards specified for each type and thickness of material.
 - 3. Reinforcement:
 - a. Mill certificates for each heat of steel provided.
 - b. Reinforcement placement drawings:
 - 1) Show anchor bolt locations based on anchor bolt templates for approved equipment.
 - c. Concrete bar supports:
 - 1) Precast concrete bar supports (dobies): Manufacturer's product data indicating compression strength of concrete supports and material used for tie wires.
 - 2) Wire chairs and slab bolsters: Manufacturer's product data.
 - 4. Concrete materials:
 - a. Cement:
 - 1) Mill certificate in accordance with ASTM C150 or ASTM C595. Include type and results of testing for alkali content measured as equivalent alkalis.
 - b. Supplementary cementitious materials:
 - 1) Fly ash: Identify source and provide testing results documenting compliance with ASTM C618 and any additional requirements of this Section.
 - c. Aggregates:
 - 1) Type, pit or quarry location, and producer's name.
 - 2) Commercial laboratory test reports for samples of each aggregate proposed for use. Tests shall have been made not more than 24 months prior to the date of the Submittal.
 - a) Fine aggregate: Gradation analysis, specific gravity, reactivity, and reports of deleterious materials to document compliance with ASTM C33.
 - b) Coarse aggregate: Gradation analysis, specific gravity, soundness, reactivity, and reports of deleterious materials to document compliance with ASTM C33 for each size used.
 - d. Admixtures:
 - 1) Manufacturer's catalog cuts and product data indicating compliance with the standards specified.

5. Concrete mixes: Submit full details, including:
 - a. Mix proportions measured by both weight and volume and concrete properties for each class of concrete proposed for use.
 - 1) Information on correction of batching for varying moisture contents of fine aggregate.
 - b. Data to establish the average compressive strength:
 - 1) If established by field test records, submit:
 - a) Product and test data for the materials used in the mix.
 - b) Actual mix proportions used in the mix producing the record.
 - c) Field test data for slump, air content, and 28-day compressive strength. Include not less than 15 tests in accordance with ACI SPEC-301.
 - 2) If established by testing of trial batches, submit:
 - a) Confirmation that the materials and proportions used in the trial batches are those that will be provided for the mix.
 - b) Mix test data for slump, air content, and 28-day compressive strength.
 - 3) For either method, include calculations for:
 - a) Standard deviation: Calculated in accordance with ACI SPEC-301 requirements.
 - b) Required average compression strength (f'_{cr}) using the standard deviation calculated in accordance with ACI SPEC-301 requirements.
 - c) Statement demonstrating that the average compression strength from field test records or from trial batch testing for each mix ($f'_{c_{avg}}$) exceeds the required average compressive strength (f'_{cr}) for that mix.
 - c. Data to establish alkali load:
 - 1) Determine and include the alkali load of the proposed mix.
 - d. Data to establish chloride content:
 - 1) Submit test results showing that the concrete mix contains water soluble chloride ion content contributed from the constituents, including water, aggregates, cementitious materials, and admixtures is less than the limit specified in Table B of this Section. Test shall be performed in accordance with ASTM C1218 at age between 28 and 42 days after mixing.
 6. Concrete finishing and curing materials:
 - a. Manufacturer's name and product datasheets.
- C. Shop Drawings:
1. Reinforcement:
 - a. Submit Drawings showing bending and placement of reinforcement.
 - 1) Drawings shall be in accordance with ACI MNL-66.
 - 2) Clearly show placement, shapes, and dimensions of each bar listed in the bill of materials, including additional reinforcement at corners and openings required by details in the Contract Documents.
 - 3) Show splice locations and bar lengths reflecting the Contractor's intended placement sequence.

- D. Samples:
 - 1. Form ties: If requested by the Engineer.
 - 2. Concrete bar supports: If requested by the Engineer, provide samples of:
 - a. Precast concrete bar supports (dobies).
 - b. Wire chairs and slab bolsters.

- E. Procedures:
 - 1. Contractor's plans for production, placement, finishing, curing, protection, and temperature monitoring of concrete during the following environmental conditions:
 - a. Hot weather.
 - b. Cold weather.
 - 2. Contractor's proposed sequence of concrete placements.

- F. Project record documents:
 - 1. For the following items, note location of concrete in the structure, and include tag numbers of associated cylinders for compression strength tests.
 - 2. Concrete delivery tickets. Submit copies of concrete delivery tickets within 24 hours after delivery.
 - 3. Field test reports: Results of field-testing for slump, temperature, unit weight, and air entrainment.
 - 4. Testing laboratory reports for compression strength.

- G. Notifications:
 - 1. Modifications to concrete mixes:
 - a. Submit notification of any adjustments to mixture proportions and any changes in materials made during the course of the Work for the Engineer's review.
 - b. Include details of the changes and supporting documentation.
 - 2. Joint locations:
 - a. Where joint locations other than those indicated on the Drawings are requested, submit proposed locations for the Engineer's review.
 - b. Provide Drawings showing proposed joint locations with joint types labeled and joint details referenced.
 - 3. Reinforcement placement: Where necessary to move reinforcement beyond the specified placing tolerances to avoid interference, submit the proposed arrangement for the Engineer's review.
 - 4. Concrete placements: Submit notification of readiness for each concrete placement at least 24 hours in advance.
 - 5. Concrete repairs:
 - a. Where concrete surfaces or sections exhibit defects after removal of forms, submit description of existing conditions and of proposed repair procedures and materials.
 - b. Include photos of existing conditions with Submittal.

1.05 QUALITY ASSURANCE

- A. Tolerances on concrete construction: In accordance with ACI SPEC-117 unless more stringent requirements are specified in the Contract Documents.

- B. Concrete mixtures:
 - 1. Ensure that concrete produced has the specified characteristics in the freshly mixed state, and that those are maintained during transport and delivery and to the point of final placement.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle concrete materials to prevent damage and inclusion of foreign substances.
- B. Deliver reinforcing steel bundled and tagged with identifying tags marked in a legible manner with waterproof markings showing the same designations as indicated on the submitted Shop Drawings.
 - 1. Store off the ground and protect from moisture, dirt, oil, and other injurious contaminants.
- C. Protect concrete accessories from weather and direct exposure to sunlight before installation.

1.07 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Hot weather concreting: Construct in accordance with ACI PRC-305 during conditions when the ambient air temperature is above 90 degrees Fahrenheit.
 - 2. Cold weather concreting: Construct in accordance with ACI PRC-306 when ambient air temperature is below 40 degrees Fahrenheit or is 45 degrees Fahrenheit and falling.
 - 3. Conditions that promote rapid drying of freshly placed concrete, such as low humidity, high temperature, and wind: Take corrective action to minimize loss of water from the concrete.

1.08 SEQUENCING AND SCHEDULING

- A. Schedule placing of concrete in such a manner that completes any single placing operation to a construction contraction, or expansion joint as indicated on the Drawings or accepted by the Engineer in advance of the placement.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Forms:
 - 1. Design and performance requirements:
 - a. Design and performance of formwork shall be the responsibility of the Contractor, subject to the requirements of the Contract Documents.
 - b. Design, construct, and brace formwork to:
 - 1) Carry all loads applied or transmitted, including the pressure resulting from placement and vibration of plastic concrete.
 - 2) Remain tight to prevent loss of mortar.

- 3) Maintain specified tolerances and provide finished surfaces as specified.
 - c. Maximum deflection of facing materials and supporting members on surfaces exposed to view in the finished work: 0.0042 times the clear span (span/240).
 - d. Maximum deviation from alignment (horizontal or vertical): In accordance with ACI SPEC-117.
 - 2. Form facing materials:
 - a. Surfaces exposed to view in the finished work:
 - 1) Facing materials shall produce a smooth, uniform texture on the concrete.
 - 2) Do not use materials with raised grain, tears, worn edges, patches, dents, or other similar defects.
 - 3) Acceptable materials: Plywood with "C" or better face, plastic-faced plywood, tempered concrete form grade hardboard, or steel.
 - b. Surfaces not exposed to view in the finished work:
 - 1) Special form facing material not required.
 - 3. Forms for chamfers and keyways:
 - a. Uniform steel, plastic, or lumber section of dimensions shown or specified.
 - b. Provide adequate stiffness and support to maintain a true line at the concrete surface.
 - c. Treated to eliminate bond with the concrete if required to produce a smooth, uniform, and undamaged finish upon removal.
- B. Form ties:
- 1. General:
 - a. Provide form ties fabricated by recognized manufacturer of concrete forming equipment and suitable for use with the forming system selected.
 - b. Provide ties that accurately tie, lock, and spread forms:
 - 1) Do not use wire ties or wood spreaders.
 - c. Provide form ties manufactured such that, when forms are removed, the tie leaves no metal or other material within 1-1/2 inches of the surface of the concrete.
 - d. Do not allow tie holes through forms for ties to leak during concrete placement.
 - 2. Cone snap ties: Tie with removable plastic cone leaving a tapered depression having a minimum diameter of 1 inch at the surface of the concrete and a depth of 1-1/2 inches below the surface.
- C. Dry-pack mortar for filling cone snap tie holes:
- 1. Proportioned mix of 1 part of Portland cement to 1 part plaster sand with potable water added to provide a stiff consistency that can be driven into holes and properly compacted.
 - 2. For repairs in concrete exposed to view in the finished work, mix repair mortar using the same cement and sand as that used for the concrete being patched.
 - a. Mix a trial batch and confirm color compatibility with the surrounding material.
 - b. Adjust color to match that of the surrounding concrete by adding white Portland cement if necessary.
 - 3. Admixtures or additives to mortar are not permitted.

- D. Form release agent: Commercially manufactured, non-staining formwork release agent that will prevent absorption of water by the formwork and will prevent bond between the formwork and the concrete.
 - 1. Form release agent shall comply with local air quality management regulations.

2.02 JOINT MATERIALS

- A. Synthetic sponge rubber expansion joint material:
 - 1. Elastic sponge rubber compound in accordance with ASTM D1752, Type I.
 - 2. Concrete-gray color unless otherwise noted.
 - 3. Thickness: As indicated on the Drawings.
 - 4. Manufacturers: One of the following or equal:
 - a. Williams Products Inc., Everlastic 1300.
 - b. W.R. Meadows, SealTight Sponge Rubber Expansion Joint.
- B. Bituminous fiber expansion joint material:
 - 1. Thickness: To match joint width indicated on the Drawings.
 - 2. Asphalt-impregnated fiberboard in accordance with ASTM D1751.
 - a. Manufacturers: One of the following or equal:
 - 1) Durajoint.
 - 2) W.R. Meadows, SealTight Fibre Expansion Joint.
- C. Waterstops:
 - 1. Hydrophilic rubber waterstops: As specified in Section 03154 - Hydrophilic Rubber Waterstop.

2.03 REINFORCEMENT

- A. Materials:
 - 1. Deformed bars: In accordance with ASTM A615 Grade 60.
 - 2. Welded wire fabric: Sheets of plain wire in accordance with ASTM A1064.
 - 3. Bar supports:
 - a. Over ground or mud mat:
 - 1) Precast concrete blocks with cast-in annealed steel tie wires, 16 gauge or heavier.
 - a) Compressive strength of blocks equal to or exceeding the compressive strength of the surrounding concrete.
 - 2) Height as required for a minimum 3 inches of clear concrete cover below reinforcement.
 - 3) Minimum block footprint of 4 square inches, or as required to supporting load from reinforcement while maintaining the required concrete cover.
 - b. Wire supports: Class 3, bright basic wire with galvanized coating in accordance with CRSI Manual of Standard Practice.
 - 4. Tie wire: Annealed steel.
- B. Fabrication:
 - 1. Cut and cold-bend bars in accordance with provisions of ACI MNL-66 and ACI CODE-318.
 - 2. Fabricate reinforcement to the tolerances in accordance with ACI SPEC-117.

3. Provide bars free from defects and kinks and from bends not indicated on the Drawings.

2.04 SOURCE QUALITY CONTROL

- A. Submit documentation that the proposed concrete mixes will conform to the requirements of this Section and will produce concrete having the required proportions and properties specified.
 1. Do not place concrete until the design for that mix and the results of any trial batch testing have been accepted by the Engineer.
 2. If the Engineer requires changes to the mix design, modify mixes within limits set forth in this Section and submit new mix design for the Engineer's review.
- B. After acceptance, do not change mixes or mix proportions without prior acceptance by the Engineer.
 1. Exception: At all times, adjust batching of water to compensate for free moisture content of aggregates. Total water content in the mix shall not exceed that specified.
- C. If there is change in source of cement or aggregate, or if there is a significant change in the characteristics or quality of any constituent material received from a source accepted to supply materials, submit new design mixes for each class of concrete affected.
- D. Testing of materials and mixes before placement to demonstrate that they comply with the requirements of this Section shall be at the Contractor's expense.

2.05 CONCRETE MIXES

- A. Constituent materials:
 1. Cement:
 - a. Portland cement: In accordance with ASTM C150, Type I or II:
 - 1) Cement for finishes or repairs: Provide cement from same source and of same type as concrete to be finished.
 2. Blended hydraulic cement:
 - a. In accordance with ASTM C595:
 - 1) Type IP (MS).
 - 2) Type IL (MS).
 3. Supplementary cementitious materials (SCM):
 - a. Fly ash:
 - 1) In accordance with ASTM C618, Class F.
 - 2) Sampling and testing: In accordance with ASTM C311.
 - 3) Loss on ignition: Not to exceed 4 percent.
 4. Aggregates:
 - a. General:
 - 1) Provide normal weight concrete aggregates that are sound, uniformly graded, and free of deleterious material in excess of the amounts specified.
 - 2) Do not use aggregate made from recycled materials such as crushed and screened hydraulic-cement concrete, brick, or other construction waste.

- 3) Obtain aggregate from source that is capable of providing uniform quality, moisture content, and grading during any single day's operations.
 - 4) Alkali-silica reactivity:
 - a) Provide fine and coarse aggregate classified as aggregate-reactivity class of R0 in accordance with ASTM C1778 and with expansion not greater than 0.10 percent at 14 days when tested in accordance with ASTM C1260 and not greater than 0.04 percent at 1 year when tested in accordance with ASTM C1293.
 - b. Fine aggregate:
 - 1) Provide fine aggregate consisting of clean, natural sand or of sand prepared from crushed stone or crushed gravel.
 - 2) In accordance with ASTM C33.
 - c. Coarse aggregate:
 - 1) Provide coarse aggregate consisting of gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter, or other foreign substances; and in accordance with ASTM C33, Class 4S.
 - 2) Grading: Unless otherwise specified or accepted in writing by the Engineer, provide the following:
 - a) Aggregate for Class A Concrete: ASTM C33, Size No. 57.
 - b) Aggregate for Class CE Concrete: ASTM C33, Size No. 8.
 - c) Where a combination of 2 or more sizes of coarse aggregate are used, the gradation of the blend shall conform to the grading requirements in accordance with ASTM C33 for the size number specified.
 5. Water:
 - a. Water for concrete mixes, for washing aggregate, and for curing concrete: Potable water, clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
 - b. Do not exceed the optional chemical limits of ASTM C1602.
 6. Admixtures:
 - a. General:
 - 1) Do not use admixtures, except those specified, unless written authorization has been obtained from the Engineer.
 - 2) Admixtures shall be compatible with concrete and other admixtures. Admixtures (other than fly ash) shall be the products of a single manufacturer to ensure compatibility.
 - 3) Do not use admixtures containing chlorides in excess of 0.5 percent by weight of cement when calculated as chloride ion.
 - b. Air entraining admixture: In accordance with ASTM C260.
 - c. Water reducing admixture:
 - 1) In accordance with ASTM C494, Type A or Type D.
 - 2) Not containing air-entraining agents.
- B. Mix design and proportioning:
1. Proportion mixes to provide compression strength, workability, and durability as specified in this Section.
 2. Submit documentation that the proposed mixes will conform to the requirements of this Section and will produce concrete having the required properties.

3. Compression strength:
 - a. Proportion each concrete mix to provide the required average compressive strength (f'_{cr}) determined in accordance with the provisions of ACI SPEC-301.
 - b. Determine required average compressive strength (f'_{cr}) for each class of concrete using the specified compressive strength of the mix, f'_c , and the standard deviation determined in accordance with ACI SPEC-301.
 - 1) Establish the standard deviation in accordance with ACI SPEC-301 and based on either field test records or based on trial batches.
 - 2) Documentation of standard deviation based on field test records:
 - a) Calculate standard deviation in accordance with ACI SPEC-301 procedures using test records that:
 - (1) Represent materials, quality control procedures, and conditions similar to those expected for this Work.
 - (2) Do not include provisions for materials and proportions that are more restrictive than the materials proposed for use in this Work.
 - (3) Represent a mix proportioned to provide a specified compressive strength (f'_c) within 1,000 pounds per square inch of that specified for the corresponding mix in this Section.
 - 3) Documentation of standard deviation based on trial batches plus empirical code requirements:
 - a) When records including at least 15 consecutive tests that span a period of at least 45 calendar days are not available, determine required average compressive strength (f'_{cr}) from Table A:

Table A: Required Average Compressive Strength	
Specified Compressive Strength f'_c (pounds per square inch)	Required Average Compressive Strength f'_{cr} (pounds per square inch)
Less than 3,000	$f'_c + 1,000$
3,000 to 5,000	$f'_c + 1,200$

4. Workability:
 - a. Provide concrete with workability and consistency that can be readily worked into corners and angles of forms and around reinforcement without excessive vibration and without permitting materials to segregate or free water to collect on the surface.
5. Cement content:
 - a. Cementitious materials content: Conform to values specified in Table B of this Section.
 - b. Ratio of water to cementitious materials:
 - 1) Conform to values specified in Table B of this Section.
 - 2) Total water, including that from moisture content of aggregates and admixtures, shall not exceed that specified in Table B of this Section.
6. Supplementary cementitious materials:
 - a. Fly ash:
 - 1) Maximum of 30 percent by weight of total weight of cementitious materials (cement plus fly ash). Other supplemental cementitious materials shall not be used without prior acceptance by the Engineer.

7. Aggregates:
 - a. Ratio of coarse aggregate to fine aggregate: Not less than 1.0 or more than 2.0 for all concrete classes, with exception of Class CE.
8. Admixtures:
 - a. Use in accordance with manufacturer's instructions.
 - b. Air entraining admixture:
 - 1) Not required.
 - c. Water reducing admixture:
 - 1) No decrease in cementitious materials content is permitted as a result of use of water-reducing admixture.
 - d. High range water reducing admixture/plasticizing admixture:
 - 1) Not permitted.
9. Concrete mix design requirements by class:
 - a. Provide concrete mixes for each class specified in this Section and indicated in Table B of this Section.
 - b. Use each class at the locations specified in the following paragraphs or indicated on the Drawings.
 - 1) Class A concrete: General use. Use at all locations unless otherwise indicated on the Drawings or listed in the following paragraphs.
 - 2) Class C concrete: May be used as fill for unauthorized excavation, for thrust blocks and ground anchors for piping, for bedding of pipe, and elsewhere as indicated on the Drawings.
 - c. Pumped concrete: Provide a separate mix design and substantiation testing for each class to be placed by pumping.

Table B: Concrete Classes

Concrete Class	Minimum Specified Compressive Strength at 28 days, f' _c ⁽¹⁾ (pounds per square inch)	Ratio of water to cementitious materials ^(2,3) (minimum - maximum)	Cementitious Materials Content ⁽³⁾ (pounds per cubic yard of concrete by weight)	Cement Type	Maximum Chloride Content (percent by weight of cement)	Maximum Coarse Aggregate Size ⁽⁴⁾	Air Entrainment (percent) (N/R: not required)	Admixtures required ⁽⁵⁾	Slump Range (inches)
A	4,000	0.40 to 0.45	535 to 575	ASTM C150, Type II(MH) or ASTM C595, Type IL(<15)(MS) or IP(20)(MS)	0.15	57	N/R	WRA	2 to 4
C	2,500	0.62 max.	423 min.	ASTM C150, Type II(MH) or ASTM C595, Type IL(<15)(MS) or IP(20)(MS)	No limit	57	N/R	WRA	3 to 6

Table B: Concrete Classes

Concrete Class	Minimum Specified Compressive Strength at 28 days, f' _c ⁽¹⁾ (pounds per square inch)	Ratio of water to cementitious materials ^(2,3) (minimum - maximum)	Cementitious Materials Content ⁽³⁾ (pounds per cubic yard of concrete by weight)	Cement Type	Maximum Chloride Content (percent by weight of cement)	Maximum Coarse Aggregate Size ⁽⁴⁾	Air Entrainment (percent) (N/R: not required)	Admixtures required ⁽⁵⁾	Slump Range (inches)
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Notes:

- (1) At locations where concrete will not be subjected to load from other elements of the structure or from the Contractor's placing operations, maximum time period for achievement of specified compressive strength may be extended to 56 days when accepted by the Contractor's Engineer.
- (2) W/C Ratio = Ratio of water to cementitious materials (Portland cement plus supplemental cementitious material) by weight Include weight of admixtures in the water content of the mix when the quantity of the admixtures exceeds 10 ounces per 100 pounds of cement.
- (3) Provide mix within the range of W/C ratio and cementitious materials content indicated.
- (4) Size number in ASTM C33, Table 2.
- (5) Admixtures are designated as follows:
 AEA: Air entraining admixture.
 CA: Coloring admixture.
 WRA: Water reducing admixture.

2.06 CONCRETE BATCHING AND MIXING EQUIPMENT

- A. Provide equipment and facilities for accurate measurement and control of materials.
 1. At all times, maintain proportions of concrete mix within specified limits.
 2. Control and adjust batch weights to secure maximum yield.

- B. Measuring or weighing equipment:
 1. Furnish apparatus for weighing aggregates and cementitious materials that is suitably designed and constructed for this purpose.
 2. Devices shall bear the current and valid seal of the Sealer of Weights and Measures in the Authority having jurisdiction.
 3. Furnish devices capable of providing successive quantities of individual materials measured to within 2 percent of desired amount of that material.

- C. Mixing equipment:
 1. Mixes shall be ready-mix or transit-mixed concrete in accordance with ASTM C94.
 - a. Hand-measured or hand-mixed batches shall not be used.
 - b. On-site volumetric batching using pre-packaged dry materials shall not be used.

2. Provide equipment capable of combining aggregates, cementitious materials, water, and admixtures into a thoroughly mixed and uniform mass during the time periods specified, and capable of discharging the resulting mixture without segregation.
3. Maintain mixing equipment in good working order. Operate at loads and speeds, and for periods of time recommended by the manufacturer or specified in this Section.

2.07 CONCRETE FINISHING AND CURING MATERIALS

- A. Evaporation retardant:
 1. Manufacturers: One of the following or equal:
 - a. Euclid Chemical Co., Eucobar.
 - b. Master Builders Solutions/Sika, MasterKure ER 50.
- B. Plastic membrane for curing:
 1. White polyethylene film in accordance with ASTM C171:
 - a. Nominal thickness not less than 0.0040 inch when measured in accordance with ASTM D2103, and thickness at any point not less than 0.0030 inch.
 - b. Loss of moisture: Not to exceed 0.055 grams per square centimeter of surface when tested in accordance with ASTM C156.
- C. Sprayed membrane curing compound:
 1. In accordance with ASTM C309, Type 1D. Clear with fugitive dye.

PART 3 EXECUTION

3.01 GENERAL

- A. Preparation:
 1. Use construction methods and sequences that allow time for concrete to reach adequate strength to prevent damage to or overstress of the concrete structure or its elements during construction.
 2. Locations of construction, contraction, and expansion joints are indicated on the Drawings.
 - a. Make no other joints, except as accepted in advance by the Engineer.
 - b. Schedule placing of concrete to complete any single placing operation between designated joints.
 - c. Schedule and sequence placements to allow adequate time for concrete to achieve adequate strength before subsequent placements and loads are applied to the structure.
- B. Verification of conditions:
 1. Do not place concrete until:
 - a. Forms have been thoroughly cleaned of dirt and debris, and form release agents have been applied.
 - b. Forms have been thoroughly checked for alignment, level, strength, and accurate location of reinforcement, joint accessories, and mechanical and electrical inserts or other embedded items.

- c. Reinforcement is secure and properly fastened in its correct position.
 - d. Dowels, bucks, sleeves, hangers, pipes, conduits, anchor bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored to maintain a minimum 1 1/2-inch clearance between the item and any concrete reinforcement. Secure embedded items in position by wiring or welding to the reinforcement is not permitted.
 - e. Forms are aligned and secured, and loose form ties at construction joints have been retightened.
2. Notify the Engineer in writing of readiness, not just intention, to place concrete in any portion of the Work:
 - a. Provide this notification in advance of operations, allowing such time as the Engineer deems necessary to make final observation of preparations at location of the concrete placement.
 - b. Have forms, reinforcement, screeds, anchors, ties, embeds, and inserts in place before notifying the Engineer of readiness for final observations.
 3. Do not place concrete until the Engineer has completed final observations of conditions at the placement and has given acceptance to proceed.

3.02 FORMING

A. General:

1. Do not use earth cuts as forms for vertical or sloped surfaces unless specifically required by or indicated on the Contract Documents.
2. Joints: Locate joints as indicated on the Drawings:
 - a. Submit joint locations other than or differing from those indicated on the Drawings for the Engineer's review before construction.
3. Chamfers:
 - a. Permanently exposed outside corners: Provide 3/4-inch chamfer.
 - b. Re-entrant corners:
 - 1) Chamfer not required.
 - 2) Corner may be left square.
 - c. Edges of formed joints: Chamfer not required, except where indicated on the Drawings.
4. Level strips: Install level strips at top of wall concrete placements to maintain true line at horizontal construction joints.

B. Constructing and erecting formwork:

1. Brace and anchor formwork to ensure vertical and lateral stability and to maintain finish tolerances when subjected to uplift pressures and lateral pressures from plastic concrete.
 - a. Ensure that formwork is positioned, braced, and firmly held against previously placed concrete to maintain flush surfaces and to prevent loss or leaking of mortar at construction joints.
 - 1) At joints with flush surfaces exposed to view, lap contact surface of form a maximum of 1 inch over the previously placed concrete.
 - b. Design and construct forms with sufficient strength and stiffness that deflections resulting from loading by plastic concrete will not exceed the surface tolerance limits specified.
 - c. Set forming materials in an orderly and symmetrical arrangement, keeping the number of seams to a practical minimum.

- d. Form ties: Tie forms together using cone snap ties placed at not more than 2-foot centers vertically and horizontally.
 - e. Construct formwork to permit easy removal without damage to formed surfaces.
 - f. Provide temporary openings at the base of column and wall formwork to allow cleaning and inspection immediately before concrete placement.
 - g. Cracks, openings, or offsets at joints in formwork: Close those that are 1/16-inch or larger by tightening forms or by filling with acceptable crack filler.
2. Where forms are reused, clean surfaces of mortar, grout, and foreign materials before coating with form release agent and setting.
 3. Cover formwork surfaces with form release agent to prevent bond with the concrete:
 - a. Do not allow form release agent to puddle in the forms.
 - b. Do not allow form release agent to contact reinforcement, embeds, or previously placed concrete.
 4. Provide runways supported directly on the formwork for moving equipment and supplies during preparations for concreting:
 - a. Do not rest such runways on reinforcement.
- C. Embeds, joints, and accessories:
1. Position pipes, sleeves, conduits, inserts, anchors, castings, and other embedded items in the forms, and anchor to formwork to prevent displacement.
 2. Fill voids in sleeves, pipes, inserts and anchor slots with readily removable material, and seal if required to prevent entry of mortar.
 3. For pipe or conduit runs, position embeds to allow at least 3 inches of clear concrete separation between parallel runs of pipes, conduits or any combination of these items with each other or with reinforcement.
- D. Removing formwork:
1. Remove forms after the specified time for curing and protection has been provided and when operations will not damage concrete.
 2. Immediately after forms are removed, carefully examine concrete surfaces.
 - a. Report any irregularities in surfaces and finishes to the Engineer.
 - b. Where surface repairs are needed, contact the Engineer with description of conditions and description of repair procedures before proceeding with the work.
 3. Immediately follow form removal with installation of specified curing materials and procedures.
 4. After forms are removed from wall and curing is complete, fill tie holes as follows:
 - a. Remove form ties and cones from surfaces.
 - b. Roughen cone-shaped tie holes by heavy sandblasting before repair.
 - c. Clean and dampen tie holes, maintaining a saturated surface for at least 2 hours before applying dry-pack mortar.
 - d. Dry pack cone-shaped tie holes with dry-pack mortar as specified in this Section.

3.03 PLACING CONCRETE REINFORCEMENT, EMBEDS, AND ACCESSORIES

- A. Preparation:
 - 1. Cut and bend deformed steel reinforcement in the shop and deliver completed bars to the Site for installation.
 - a. Do not field-bend deformed reinforcement.
 - 2. Surface preparation:
 - a. Thoroughly clean reinforcing bars from rust scale, loose mill scale, rust coat, dirt, oil, and other coatings that adversely affect bonding capacity when placed in the Work.
 - 1) Thin coating of red rust resulting from short exposures will not be considered objectionable.
 - b. Remove concrete or other deleterious coatings on dowels and other reinforcement projecting from previous placements by wire brushing or sandblasting before the reinforcement is embedded in the subsequent placement.
- B. Support of reinforcement and accessories:
 - 1. Provide supports for deformed bars and wire fabric to maintain reinforcement position indicated on the Drawings and to provide specified minimum clear concrete cover around the reinforcement.
 - 2. Use number of supports required to prevent reinforcement from sagging and to support loads during construction, but in no fewer quantities and locations than recommended by ACI MNL-66 and CRSI Manual of Standard Practice.
 - 3. Support wire fabric from reinforcing supports:
 - a. Do not place wire fabric on grade or forms for subsequent lifting into plastic concrete during the concrete placement.
 - b. Take care to maintain specified position of wire fabric in the concrete section and to prevent bending, draping, or kinking of the wires.
 - 4. Do not:
 - a. Use brick, broken concrete masonry units, concrete spalls, rocks, or other such material for supporting reinforcement.
 - b. Support reinforcement on additional reinforcing bars installed with less cover than that required by the Contract Documents (give away bars).
 - c. Adjust location of reinforcement indicated on the Drawings to increase cover over support bars.
 - 5. Furnish and use templates for placing column and wall dowels.
- C. Placing reinforcement:
 - 1. Locate reinforcement to provide minimum clear concrete cover specified:
 - a. Where cover is not specified, provide cover in accordance with ACI CODE-318.
 - 2. Accurately place reinforcement in accordance with the tolerances of ACI SPEC-117:
 - a. Where reinforcement must be moved beyond the specified placing tolerances to avoid interference with other reinforcement, conduits, or embeds, submit the proposed arrangement for the Engineer's review.
 - 3. Fasten reinforcement securely in place with wire ties:
 - a. After tying, bend ends of wire ties inward towards the center of the concrete to match clear concrete cover provided for reinforcement.
 - 4. Do not weld reinforcing bars or wires.

5. Deformed reinforcing bars:
 - a. Tie slab bars at every intersection around the perimeter of slabs.
 - b. Tie wall bar and slab bar intersections, other than those around the perimeter, at every 4th intersection, but not more than 48 inches on center each way.
 - c. Lap splices:
 - 1) Lap reinforcement at splices as indicated on the Drawings or specified.
 - 2) Unless indicated on the Drawings, install lap splices with bars in contact and fastened together with tie wire.
 - 3) If lap splice length is not indicated on the Drawings, provide lap splice equal to 40 times reinforcing bar diameter.
6. Welded wire fabric reinforcement:
 - a. Bend fabric as indicated on the Drawings or required to fit Work.
 - b. Straighten fabric to make reinforcement in each face a flat, planar surface before placing in the Work.
 - c. Extend welded wire fabric across concrete section to provide fabric to within 2 inches of vertical concrete edges.
 - d. Lap splice welded wire fabric as indicated on the Drawings:
 - 1) If no splice details are indicated, lap fabric at least 12 inches, fasten with wire ties spaced not more than 24 inches on center, and lace lap with wire of the same diameter of the fabric.

3.04 BATCHING, MIXING, TRANSPORTING, AND DELIVERING CONCRETE

- A. General:
 1. Measure, batch, mix, transport, and deliver ready-mixed concrete in accordance with ASTM C94.
- B. Measuring and batching:
 1. Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the Engineer.
 - a. Weigh cementitious materials separately.
 2. Furnish satisfactory means for checking moisture content of aggregates before batching.
 - a. Adjust mix water to compensate for free moisture content of aggregate.
 3. Mixing water:
 - a. Measure by volume or by weight.
 - b. Maximum water-to-cementitious materials ratio for each concrete class shall not exceed that specified in Table B of this Section.
 4. Admixtures:
 - a. Provide admixtures as specified.
 - b. Batch products by means of mechanical batcher capable of accurate measurement, and in accordance with the admixture manufacturer's instructions.
- C. Mixing and transporting:
 1. Mixing:
 - a. Equip each truck mixer with device capable of counting number of drum revolutions and interlocked to prevent discharge of concrete from drum before required number of revolutions is complete.

- b. Once drum revolutions commence, continuously revolve drum until it has completely discharged its batch.
 - c. Do not add water until drum commences revolutions.
 - d. Engineer may require an increase in the designated minimum number of revolutions, or a decrease in the designated maximum number of revolutions if necessary to obtain satisfactory mixing.
 - 1) Incorporate such changes without additional costs to the Owner.
2. Do not exceed the following time period for mixing and delivery:
- a. Total elapsed time from addition of water at batch plant through discharging of mix: Not to exceed the lesser of 90 minutes or 300 revolutions of the mixer drum.
 - b. Total elapsed time for from arrival at the Project Site to completing discharge of mix: Not to exceed 30 minutes.
 - c. Under conditions contributing to quick setting, the Engineer may reduce total elapsed time permitted.
- D. On-site acceptance of concrete mixes:
- 1. Concrete shall possess the properties specified in this Section at the point of placement.
 - 2. Do not place concrete:
 - a. Having slump outside the limits indicated in Table B of this Section.
 - b. That does not conform to specifications for entrained air content.
 - c. For which the total elapsed time of mixing or elapsed time at the Site exceeds the specified maximums.

3.05 CONVEYING, DEPOSITING, AND CONSOLIDATING CONCRETE

- A. Preparation:
- 1. General:
 - a. Clean construction joints and forming surfaces of dirt, sawdust, chips, and other debris after forms are built and immediately before concrete or grout placement.
 - 1) Use vacuum cleaner if required to provide clean surfaces.
 - b. Remove snow, ice, frost, and standing water from surfaces of formwork, reinforcement, and embeds in contact with concrete.
 - c. Secure reinforcement, joint materials, anchors, embeds, and other items in place.
 - d. Obtain the Engineer's observation and acceptance of preparations.
 - e. During conveying, placement, consolidation, and finishing of concrete, protect surrounding construction, including concrete walls and slab surfaces, from concrete splatter.
 - f. Thoroughly clean surrounding construction at the completion of each placement and before splatter sets up.
 - 2. Concrete construction on grade:
 - a. Provide subgrade preparation, base materials, and compaction as required by the Contract Documents.
 - b. Remove loose soils, debris, standing water, snow, or ice from subgrade.
 - c. Provide moist subgrade with no standing or free water and no muddy or soft spots.
 - 1) When subgrade is not moist, sprinkle with water not less than 2 or more than 6 hours in advance of placing concrete.

- 2) If subgrade becomes dry prior to actual placing of concrete, sprinkle again, without forming pools of water.
 3. Weather conditions:
 - a. Hot weather: In hot weather conditions, make provisions in advance of placement for windbreaks, shading, fogging, sprinkling, ponding, or wet covering.
 - b. Cold weather: In cold weather conditions, make provisions to maintain the required concrete temperatures without overheating or drying, and without exposing concrete to carbon dioxide from heater exhaust.
 - c. Precipitation:
 - 1) Do not begin placements while rain, sleet, or snow is falling or anticipated, or unless adequate protection is provided.
 - 2) Do not allow precipitation to increase concrete water content or to damage the surface of the concrete.
 - d. Wind:
 - 1) Do not begin placements during wind events that will blow dust or debris into the plastic concrete.
 - 2) Do not allow wind-blown debris to become embedded in or to damage the surface of the concrete.
 - 3) At all times, have sufficient coverings on hand to protect new concrete from excessive drying or blowing debris.
- B. Conveying concrete:
1. Convey from mixer to place of final deposit by methods that prevent segregation or loss of materials.
 2. Use chutes, pumps, and conveyors of size and design that will ensure continuous flow of concrete at point of delivery without cold joints.
 3. Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from the chute or conveying device.
 4. Keep conveying equipment clean by thoroughly washing and scraping upon completion of any placement.
- C. Depositing concrete:
1. Do not place concrete under the following conditions:
 - a. After initial set has occurred.
 - b. When re-tempering has occurred.
 2. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.
 - a. Do not use vibrators to move concrete from its point of deposit.
 - b. Use tremies for placing concrete where drop is over 5 feet.
 3. Place concrete continuously in approximately horizontal layers not exceeding 24 inches in depth. Bring level up evenly in all parts of forms.
 - a. After placement begins, continue without significant interruption and as a continuous operation until the end of that placement is reached.
 - b. Do not allow "cold joints" to form between adjacent layers or areas of the placement, or initial set to form on "wet edge" of placements.

- c. Take precautions to prevent delays between placement of adjacent layers or areas from exceeding 20 minutes.
 - 1) If more than 20 minutes elapse after the initial surface was placed, spread a layer of neat cement grout, as specified for construction joints before depositing additional concrete.
 - 4. Placing concrete on slopes: Commence placement at bottom of slope and work upward.
 - 5. Placing horizontal concrete monolithically with structures below:
 - a. If concrete for slabs, beams, or walkways is to be cast monolithically with walls or columns below, do not place the horizontal concrete elements until the concrete in walls or columns below has been placed, consolidated, and allowed to achieve initial set.
 - b. Allow set time of not less than 1 hour.
 - c. Maintain a moist surface at the top of the walls or columns during the setting period.
 - 6. Placing a second concrete lift over hardened concrete below:
 - a. Take special precautions in formwork at top of old lift and bottom of new lift to prevent:
 - 1) Spreading and vertical or horizontal displacement of forms.
 - 2) Grout "bleeding" onto finished concrete surfaces.
- D. Consolidating concrete:
 - 1. Thoroughly consolidate concrete into forms and around reinforcement, pipes, and other embeds using mechanical vibrators.
 - a. Take special care to place concrete solidly against forms, leaving no voids.
 - b. Make concrete solid, dense, compact, and smooth.
 - 2. Provide vibration energy sufficient to cause concrete to flow and readily settle into place, leaving no voids. Vibration should visibly affect concrete over a radius of at least 18 inches without segregation.
 - 3. Vibrators:
 - a. At all times, have sufficient vibrators on hand to consolidate concrete as it is placed.
 - b. In addition to vibrators in use while concrete is being placed, have on hand at least 1 spare vibrator in serviceable condition.
 - c. Place no concrete until it has been ascertained that vibrating equipment, including spares, is in serviceable condition.

3.06 FINISHING CONCRETE

- A. Provide concrete finishes as indicated on the Drawings.
- B. Liquid evaporation retardant:
 - 1. Apply evaporation retardant when environmental conditions will result in rapid evaporation of moisture from the surface of the fresh concrete during finishing operations. Such conditions include low humidity, high heat, and wind occurring alone or in combination.
 - 2. Immediately after the concrete is screeded, coat the surface of the concrete with a liquid evaporation retardant.
 - 3. Apply the evaporation retardant again after each work operation as necessary to prevent drying shrinkage cracks and crazing at the surface.

3.07 CURING AND PROTECTING CONCRETE

- A. Curing concrete:
 - 1. Cure concrete by methods specified in this Section.
 - 2. Keep concrete continuously moist and at a temperature of at least 50 degrees Fahrenheit for at least 7 days (cure period) after placement unless the details of a particular method specify a longer period.
 - 3. Make provisions to maintain moisture or curing membrane integrity at edges of slabs, tops of walls, and joint surfaces, and to prevent loss of protection.
 - 4. Schedule of curing methods:
 - a. Concrete surfaces that will receive additional materials that require bond to the initial placement (including concrete; concrete repairs, coatings, paints, sealers; grout; and other materials):
 - 1) Water curing or plastic membrane curing.
 - b. Formed surfaces:
 - 1) If non-absorbent forms are left in place for the duration of the cure period after placement: No additional requirements.
 - 2) For absorbent forms or when forms are removed before the completion of the cure period: Cure by water curing, plastic membrane curing, or sprayed membrane curing.
 - c. Unformed concrete surfaces:
 - 1) Water curing, plastic membrane curing, or sprayed membrane curing.
 - 5. Water curing:
 - a. Keep surfaces of concrete constantly and visibly saturated by ponding, continuous fogging, or continuous sprinkling at all times during curing period.
 - 1) Cover surfaces if required to maintain saturated conditions.
 - 2) For horizontal surfaces, pond the surface with at least 2 inches of water or cover with saturated mats or fabric kept continuously wet.
 - b. Formed surfaces:
 - 1) Each day forms remain in place may be counted as 1 day of water curing.
 - 2) Do not loosen form ties while concrete is being cured by forms left in place.
 - 3) No further credit for curing time will be allowed after contact between the concrete surface and the forms has been broken.
 - 6. Plastic membrane curing:
 - a. Cover concrete with plastic membrane, sealing joints and edges against displacement by wind or Site operations and to prevent loss of moisture.
 - b. Install plastic membrane as soon as concrete is finished and can be walked on without damage.
 - c. Keep surfaces of concrete under plastic membrane moist at all times during the curing period.
 - 7. Sprayed membrane curing:
 - a. Application of curing compound:
 - 1) Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.
 - a) If more than 1 hour elapses between removal of forms and application of curing compound, provide water curing of affected surfaces for the full curing period.

- 2) Contractor is cautioned that the method of applying curing compound specified in this Section may require more compound than normally suggested by manufacturer of compound, and also more than is customary in the trade.
 - 3) Apply curing compound by mechanical, power-operated sprayer with mechanical agitator that will uniformly mix all pigment and compound.
 - 4) Apply compound in at least 2 coats, with each subsequent coat in a direction turned 90 degrees from the preceding coat.
 - 5) Apply curing compound in sufficient quantity that concrete has uniform appearance and that the natural color of the concrete is effectively and completely concealed immediately after spraying.
 - 6) Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.
 - 7) Apply compound to a film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.
 - 8) Take care to apply curing compound to edges of placements and over full surface profile of construction joints.
- b. Removal of curing compound:
- 1) Do not remove curing compound from concrete before the completion of the cure period.
 - 2) Before placing fresh concrete against a surface previously coated with curing compound, remove the curing compound by heavy sandblasting, or alternate method acceptable to the Engineer.
 - 3) Prior to final acceptance of the Work, remove any curing compound on surfaces exposed to view by sandblasting or other acceptable method. After removal, only the natural color of finished concrete shall remain visible, and such color shall be uniform over the entire surface.
- B. Protecting concrete:
1. Immediately after placement, protect concrete from hot or cold weather, and mechanical damage.
 2. Temperature:
 - a. Cold weather: Protect concrete during the curing period so that the concrete temperature is maintained within the following requirements.
 - 1) Sections less than 12 inches thick: Minimum 55 degrees Fahrenheit.
 - 2) Sections 12 to 36 inches thick: Minimum 50 degrees Fahrenheit.
 - b. Hot weather: Protect concrete during the curing period so that the concrete temperature does not exceed 90 degrees Fahrenheit.
 - c. Remove protection against temperature gradually so that concrete surface temperature does not drop or rise by more than 40 degrees Fahrenheit during any 24-hour period.
 3. Maintain forms, shoring, and bracing in place after concrete placement for a period after concrete placement as indicated in the following paragraphs. Forms may be removed after these periods if the concrete has developed sufficient strength and hardness to resist surface or other damage.
 - a. Vertical forms:
 - 1) General: Minimum 24 hours after concrete placement.
 - 2) Sides of footings: Minimum 24 hours after concrete placement.
 - 3) Sides of beams, girders, and similar members: Minimum 48 hours after concrete placement.

- b. Horizontal forms:
 - 1) Slabs, beams, and girders: Until concrete reaches specified compressive strength, $f'c$, or until shoring is installed.
 - c. Shoring for slabs, beams, and girders:
 - 1) Shore until concrete strength reaches specified compressive strength, $f'c$.
 - a) Temporary shoring may be required after the specified compressive strength is reached if construction loads will exceed the designated live load capacity of the structure.
 - d. Wall bracing:
 - 1) Brace until strength of concrete beams and slabs laterally supporting the wall reaches specified compressive strength, $f'c$.
- C. Loads against or on the concrete:
- 1. Loading of green concrete, by backfilling or by placing personnel and equipment on the surface, is not permitted.
 - 2. Backfilling: Do not place backfill against concrete walls until the wall and all elements attached to it, including connecting slabs or beams, are fully braced by the structure, and have achieved their minimum specified compressive strength, $f'c$.

3.08 JOINTS AND JOINT PREPARATION

- A. Joint locations and details:
- 1. Construct concrete work as monolith to the extent practical.
 - 2. Construct joints as indicated on the Drawings and as specified.
 - 3. Locations of construction, expansion, and other joints are indicated on the Drawings or specified in this Section.
 - a. Do not relocate, add, or delete joints without prior approval from the Engineer.
- B. Construction joints:
- 1. Where spacing is not indicated on the Drawings, provide construction joints in slabs and walls at intervals not greater than 35 feet.
 - 2. Construct as indicated on the Drawings.
 - 3. Before placing fresh concrete against the joint: Use heavy sandblast to thoroughly clean joint surfaces and reinforcement crossing the joint of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter.
 - 4. Just before placing concrete against the joint, wash surface with water to saturate joint surface and concrete surfaces within 12 inches of the joint.
 - 5. Horizontal joints:
 - a. Immediately before placing concrete, thoroughly spread bed of neat cement grout over the joint surface. Grout shall be as follows:
 - 1) Use same sand-to-cementitious materials ratio that is used for concrete mix.
 - 2) Use same materials that are used for concrete.
 - 3) Use water-to-cementitious materials ratio that is no more than that specified for concrete.
 - b. Grout thickness: Not less than 1/2 inch, or more than 1 inch.

- C. Contraction joints:
 - 1. Where spacing is not indicated on the Drawings, provide contraction joints in slabs and walls at intervals not greater than 35 feet.
 - 2. Construct as indicated on the Drawings.
 - 3. Before placing fresh concrete against the joint: Use heavy sandblast to thoroughly clean joint surfaces and reinforcement crossing the joint of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter.
 - 4. Coat face of previously placed concrete at joint with form release agent. Make provisions to prevent the accidental application of agent on the reinforcement.

- D. Expansion joints:
 - 1. Where width is not indicated on the Drawings, provide 3/4-inch-wide joint.
 - 2. Construct as indicated on the Drawings.
 - 3. Do not extend reinforcement, conduits, or other items through expansion joints unless details for such crossings are indicated on the Drawings.
 - 4. Preformed expansion joint material:
 - a. Accurately position joint filler in the joint.
 - 1) Fasten to concrete or forms with adhesive.
 - 2) Fastening joint filler using nails, bolts, screws, or similar items is not permitted.
 - b. Tape splices in joint filler to prevent intrusion of mortar.

3.09 COLD WEATHER CONCRETING

- A. Preparation:
 - 1. Remove snow, ice, and frost from surfaces, including soil subgrade, that will receive fresh concrete.
 - 2. Do not place concrete against embedments or reinforcement at a temperature below freezing, where such items are sufficiently massive to cause adjacent concrete to freeze.

- B. Placement during cold weather:
 - 1. Placement temperature:
 - a. Minimum temperature of concrete immediately after placement shall be as specified in Table C of this Section.
 - b. Temperature of concrete as placed shall not exceed the values shown in Table C of this Section by more than 20 degrees Fahrenheit.
 - 2. Protection temperature:
 - a. Unless otherwise specified, the minimum temperature of concrete during the protection period shall be as shown Table C of this Section.
 - b. Temperatures specified to be maintained during the protection period shall be those measured at the concrete surface, whether the surface is in contact with formwork, insulation, or air.
 - c. Measure the temperature with a surface measuring device accurate to 2 degrees Fahrenheit.
 - d. Measure the temperature of concrete in each placement at regular time intervals as specified in the Contract Documents.

3. Termination of protection:
 - a. Maximum decrease in temperature measured at the surface of the concrete in a 24-hour period shall not exceed the values listed in Table C of this Section.
 - b. Do not exceed these limits until the surface temperature of the concrete is within 20 degrees Fahrenheit of the ambient temperature of surrounding temperatures.
 - c. When the surface temperature of the concrete is within 20 degrees Fahrenheit of the ambient temperature, thermal protection may be removed.

Least dimension of section (inches)	Minimum temperature of concrete as placed and maintained during the protection period (degrees Fahrenheit)	Maximum for gradual decrease in surface temperature during any 24-hour period after end of protection period (degrees Fahrenheit)
Less than 12	55	50
12 to less than 36	50	40
36 to 72	45	30
Greater than 72	40	20

- C. Curing of concrete:
 1. Prevent concrete from drying during the required curing period. If water curing is used, terminate use at least 24 hours before any anticipated exposure of the concrete to freezing temperatures.

- D. Protection of concrete:
 1. Combustion heaters: Vent flue gases from combustion heating units to the outside of the enclosures.
 2. Overheating and drying: Place and direct heaters and ducts to avoid areas of overheating or drying of the concrete surface.
 3. Maximum air temperature: During the protection period, do not expose the concrete surface to air having a temperature more than 20 degrees Fahrenheit above the values shown in Table C of this Section unless higher values are required by an accepted curing method.
 4. Protection against freezing:
 - a. Cure and protect concrete against damage from freezing for a minimum of 3 days, unless otherwise specified.
 - 1) Maintain the surface temperature of the concrete as specified in Table C of this Section.
 - b. During periods not defined as cold weather, but when freezing temperatures may occur, protect concrete surfaces against freezing for the first 24 hours after placing.

3.10 TOLERANCES

- A. Concrete:
 - 1. Finished concrete: Conform to shapes, lines, grades, and dimensions indicated on the Drawings.
 - 2. In accordance with ACI SPEC-117, except as modified in the following paragraphs:
 - a. Where more restrictive tolerances to accommodate equipment are indicated on the Drawings.
 - b. Slabs where slope is indicated:
 - 1) Uniformly slope to drain.
 - 2) Without depressions that puddle water.
 - c. Slabs indicated to be level:
 - 1) Maximum deviation of 1/8 inches in 10 feet without any apparent changes in grade.
 - 2) Without depressions that puddle water.
- B. Embeds:
 - 1. General:
 - a. Sleeves and inserts: Plus or minus 1/8 inch.
 - b. Projected ends of anchor bolts: Plus 1/4 inch; minus 0 inches.
 - c. Anchor bolt position: Plus or minus 1/16 inch.
 - 2. Equipment: Set inserts to tolerances required for proper installation and operation of equipment or systems to which insert pertains.

3.11 FIELD QUALITY CONTROL BY CONTRACTOR

- A. Provide quality control over the Work of this Section as specified in Section 01450 - Quality Control.
- B. Field tests:
 - 1. During progress of construction, provide testing to determine whether the concrete, as being produced, complies with requirements specified.
 - 2. Sampling and testing shall be performed by the Contractor's testing laboratory. Requirements as specified in Section 01450 - Quality Control.
 - a. Cooperate in testing by allowing free access to the Work for testing laboratory to sample and test materials.
 - b. Provide full access for the Engineer to observe concrete sampling and testing at any time.
 - c. Contractor is responsible for providing care of and curing conditions for test specimens in accordance with ASTM C31 until specimens are collected by testing laboratory.
 - d. Provide firmly braced, insulated, heated, closed wooden curing boxes. Include cold weather temperature and hot weather temperature control thermostat for initial curing and storage from time of fabrication through receipt at the Contractor's testing laboratory.
 - 3. Testing shall include:
 - a. Sampling of concrete in accordance with ASTM C172.
 - b. Temperature of concrete at delivery in accordance with the requirements of ASTM C1064 and as specified in this Section.

- c. Slump of concrete using slump cone in accordance with the requirements of ASTM C143. Test slump at the following intervals:
 - 1) Test slump at the beginning of each placement.
 - 2) As often as necessary to keep slump within the specified range, but not less than every 6th truck.
 - 3) When requested to do so by the Engineer.
 - 4) Observe concrete during slump test for signs of segregation:
 - a) Observe concrete for mortar or moisture flow from slumped concrete.
 - b) Reject concrete if mortar or moisture flows out of the mix.
 - d. Unit weight of concrete in accordance with ASTM C138.
 - e. Air entrainment in accordance with ASTM C173. Test air content at the following intervals:
 - 1) At the beginning of each placement.
 - 2) As often as necessary to keep entrained air within the specified range, but not less than every 6th truck.
 - 3) When requested to do so by the Engineer.
 - f. Compressive strength, f'_c , in accordance with ASTM C39. Required number of cylinders:
 - 1) Not less than 4 cylinder specimens, 4-inch diameter by 8-inches long, will be tested for each 150 cubic yards of each class of concrete; not less than 4 specimens for each half day of placement.
 - 2) One cylinder will be broken at 7 days and 3 cylinders will be broken at 28 days.
- 4. Furnish concrete for test specimens and provide manual assistance to testing lab in preparing said specimens.
 - 5. Assume responsibility for providing care and on-site curing and protection for test specimens in accordance with ASTM C31.

3.12 FIELD QUALITY CONTROL BY OWNER

- A. As specified in Section 01450 - Quality Control.
- B. Special tests and inspections: As specified in Section 01455 - Regulatory Quality Assurance.
- C. Field inspections:
 - 1. Observe construction for conformance to the Contract Documents and the accepted Submittals.
 - 2. Records of inspections:
 - a. Provide a record of each inspection.
 - b. Submit copies to the Contractor upon request.
- D. Field tests:
 - 1. Engineer may request, at any time, additional testing to confirm materials being delivered and placed conform to the requirements of the Specifications.
 - a. If such additional testing shows that the materials do not conform to the specified requirements, the Contractor shall pay the cost of these tests.
 - b. If such additional testing shows that the materials do conform to the specified requirements, the Engineer shall pay the cost of these tests.

3.13 NON-CONFORMING WORK

- A. Do not place concrete that does not conform to the requirements of these Specifications. Remove non-conforming materials from the Site.

- B. Strength requirements:
 - 1. Concrete is expected to reach higher compressive strength than the minimum specified compressive strength $f'c$ as indicated in Table B of this Section.
 - 2. Concrete strength will be considered acceptable if following conditions are satisfied:
 - a. Averages of all sets of 3 consecutive strength test results are greater than or equal to specified compressive strength $f'c$.
 - b. No individual strength test (average of 2 cylinders tested at 28 days) falls below specified compressive strength $f'c$ by more than 500 pounds per square inch.
 - 3. Whenever one or both of the conditions stated above is not satisfied, provide additional curing or testing of the affected portion as directed by the Engineer.
 - a. Costs of such curing or testing shall be at the Contractor's expense.

- C. Remove and replace or repair defective Work as directed by the Engineer:
 - 1. Do not patch, repair, or cover defective Work before observation by the Engineer.
 - 2. Make no repairs until the Engineer has accepted proposed methods for preparation and repair.

END OF SECTION