INVITATION FOR BIDS

PROJECT PH20-V61; WA17-25

CONSTRUCTION OF EAST COCOPAH LIFT STATION RENOVATIOON

EAST COCOPAH INDIAN RESERVATION

YUMA COUNTY, ARIZONA

February 2026

CONSTRUCTION OF EAST COCOPAH LIFT STATION RENOVATION
EAST COCOPAH INDIAN RESERVATION
YUMA COUNTY, ARIZONA

TABLE OF CONTENTS

ADVERTISEMENT FOR BIDS

COCOPAH INDIAN TRIBE
YUMA COUNTY, ARIZONA
EAST COCOPAH LIFT STATION RENOVATION PROJECT

General Notice

The Cocopah Indian Tribe (Owner) is requesting Bids for the construction of the following Project:

East Cocopah Lift Station Renovation Project
PH20-V61; WA17-25

Bids for the construction of the Project will be received at the **Cocopah Indian Tribe's Tribal Headquarters** located at **14515 S. Veterans Drive, Somerton, AZ 85350 within the Cocopah West Reservation**, until **Monday**, **March 16th, 2026** at **11:00 AM** local time. At that time the Bids received will be publicly opened and read the Cocopah Indian Tribe's Arts and Crafts Room in the Cultural Center Building located at **14529 Veterans Pl, Somerton, AZ 85350. The location coordinates for the Cocopah Tribal Headquarters are: (32.61528639357048, -114.76728440383518).**

The Project includes the following Work:

Construction of a new sanitary sewer lift station, approximately 90 linear feet (LF) of gravity sewer main diversion from the existing sanitary sewer system to the new sewer lift station wetwell, the installation of 55 LF of 6" sewer force main, two new sewer manholes, and sewer lift station electrical and SCADA monitoring units. The work also includes the demolition of the existing sewer gravity lines, wetwell and lift station; and electrical units and force mains.

Bids are requested for the following Contract: **PH20-V61; WA17-25; East Cocopah Lift Station Renovation Project**

The Project has an expected duration of **180** days.

Obtaining the Bidding Documents

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

https://www.cocopah.com/business-opportunities.html

Pre-bid Conference

A non-mandatory pre-bid conference for the Project will be held on **Thursday, February 19, 2026** at **11:00 AM** at the **Cocopah Indian Tribe's Wellness Center Conference Room** located at **14526 S Veterans Dr, Somerton, AZ 85350.** Attendance at the pre-bid conference is encouraged but not required.

Instructions to Bidders.

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

This Advertisement is issued by:

Owner: **Cocopah Indian Tribe**
By: **Rudy Alcala**
Title: **Cocopah Public Works Director**
Date: **February 9, 2026**
Email: **Alcalar@cocopah.gov**

INSTRUCTIONS TO BIDDERS

ARTICLE 1—DEFINED TERMS

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

A. *Issuing Office*—The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. For this project, a bid package may be obtained by contacting Rudy Alcala, Cocopah Public Works Department, at (928) 672-0616 Ext. 7504 or by email at alcalar@cocopah.gov.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 *Electronic Documents*

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 2020 or later. It is the intent of the Engineer, Owner, and Owner's Consultant that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner, Engineer, and Owner's Consultant cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner, Owner's Consultant, and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.03.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information

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

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within **15** days of Owner's request, Bidder must submit the following information:

A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Bidder's state or other contractor license number, if applicable.

D. Subcontractor and Supplier qualification information.

E. Other required information regarding qualifications.

3.02 [DELETED]

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

3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner, Owner's Consultant, and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.

4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

5.01 *Site and Other Areas*

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

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

    a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

    b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

    c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

    d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

5.03 *Other Site-related Documents*

A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

    1. DELETED

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

B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.

C. The other Site-related documents are not part of the Contract Documents.

D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

E. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

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

B. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.

C. A Site visit is scheduled for immediately following the pre-bid meeting on **February 19, 2026**.

D. Maps to the Site will be made available upon request.

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

F. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Rudy Alcala, Public Works Director, (928) 627-0616 ext. 7504 or by email at alcalar@cocopah.com, or Joel Garcia, Field Engineer, IHS, (480) 466-7825 or by email at joel.garcia@ihs.gov.** Bidder must conduct the required Site visit during normal working hours.

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

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

I. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

J. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

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

5.06 *Other Work at the Site*

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

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

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

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and

certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

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

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

A. All requests for information (RFI), questions and submittals should be directed through email to Rudy Alcala, Cocopah Public Works Director (Alcalar@cocopah.gov) and a copy sent to Joel Garcia, Indian Health Service Field Engineer (Joel.Garcia@ihs.gov). Submissions must be made no later than February 26, 2026 4:00 PM Arizona Time. RFIs and their answers will be formatted, made anonymous, and shared with all prospective bidders within seven (7) calendar days of the submission deadline.

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

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

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **five** percent of Bidder's maximum Bid price and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the

Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

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

9.02 Provisions for liquidated damages, if any, for failure to timely attain Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 The Contract for the Work, as awarded, basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute materials and equipment subsequently approved by Engineer, with assistance from Owner's Consultant, prior to submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids in the case of a proposed substitute and 5 days prior in the case of a proposed "or-equal." Each such request shall comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner. Substitutes and "or-equal" materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.05 and 7.06 of the General Conditions after the Effective Date of the Contract.

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

10.03 If an award is made, Contractor shall be allowed to submit proposed substitutes and "or-equals" in accordance with the General Conditions.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 [DELETED]

11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:

A. DELETED

11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection

to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, 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.

11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

11.05 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

11.06 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.07.N.

ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder's name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Unit Price*

A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 14—SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

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

notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.

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

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 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. 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 in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of

the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

18.05 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

18.07 *In evaluation of the bids, the Owner may, within funding limitations, give preference in the amount of five (5) percent above the lowest total bid, to qualified Indian owned firms*

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

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

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

ARTICLE 21—SALES AND USE TAXES [DELETED]

ARTICLE 22—CONTRACTS TO BE ASSIGNED [DELETED]

ARTICLE 23—FEDERAL REQUIREMENTS

23.01 *Federal requirements at Article 19 of the Supplementary Conditions apply to this Contract.*

BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

Cocopah Indian Tribe

ATTN: Rudy Alcala

Address: 14515 S. Veterans Drive, Somerton, AZ 85350

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

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

A. Required Bid security;

B. A copy of a valid CONTRACTOR's license for the state in which the work resides, at the time of bidding or Certification of Renewal;

C. Bidders claiming Indian Preference must attach a properly completed "Indian Owned Economic Enterprise Qualification Statement" to this bid. Failure to submit this form will void the Bidder's claim for Indian Preference. The "Indian Enterprise Qualification Statement" form is available in Exhibit B of this bid package.

D. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

E. **A copy of the foreman's resume, including years of experience in the installation of sewer lift stations, sewer force mains, and gravity sewer mains.**

ARTICLE 3—BASIS OF BID—UNIT PRICES

1.04 *Unit Price Bids*

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

Bid Table
East Cocopah Lift Station Renovation Project
Project #PH-20-V61 WA-17-25
Yuma County, Arizona

DIV	Description	Spec Section	Quantity	Units	Unit Cost	Line Item Cost
1	**GENERAL REQUIREMENTS**					
	Mobilization / Demobilization	TP-01	1	L.S.		
2	**CONCRETE**					
	Lift Station Site					
	Wet Well Base and Concrete Column	TP-02, TP-03, Sheet P2	18.1	C.Y.		
	Wet Well Cover Concrete Pad	TP-02, TP-03, Sheet C3, P2	144	S.F.		
	Force Main Discharge Piping Concrete Pad	TP-02, TP-03, Sheet C3, P2	80	S.F.		
	Electrical Rack Concrete Pad	TP-02, TP-03, Sheet C3, D5	77	S.F.		
	Backup Generator Concrete Pad	TP-02, TP-03, Sheet C3, E4	147	S.F.		
6	**GRAVITY SANITARY SEWERS**					
	4'-dia 15' VD Manhole A1 – Material and Installation	TP-06.03B, Sheet C3, D1	1	EA.		
	8" PVC Gravity Sewer Main from MH A1 to Wetwell	TP-06.03A, Sheet P1	35	L.F.		
	4'-dia 11' VD Manhole A2 – Material and Installation	TP-06.03B, Sheet C3, D1	1	EA.		
	8" PVC Gravity Sewer Main from MH A2 to Wetwell	TP-06.03A, Sheet P1	55	L.F.		
42	**SEWAGE LIFT STATION**					
	Lift Station	TP-42, Sheet P2	1	L.S.		
	Lift Station Electrical	TP-42, Sheet E1 to E4	1	L.S.		
43	**SEWER FORCE MAINS**					
	6" Ductile Iron Sewer Force Main	TP-43.03 B, Sheet P2	55	L.F.		
	6" Sewer Force Main Gate Valve with Box	TP-43.03 E,F, Sheet C3	1	EA.		
	8" Gravity Sewer Gate Valve with Box	TP-43.03 E,F, Sheet C3	2	EA.		
60	**CHAIN LINK FENCING**					
	Chain-link Fence	TP-60, Sheet C3	30	L.F.		
	OTHERS					
	Erosion Control	Sheet C5	1	L.S.		
	TOTAL BID CONTRACTOR PRICE:					

B. Bidder acknowledges that:

1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and

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

1.05 Total Bid Price Unit Prices)

Total Bid Price (Total of Unit Price Bids)	$

ARTICLE 4—TIME OF COMPLETION

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

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

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

1.08 *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.

1.09 *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.

1.10 *Receipt of Addenda*

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

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

1.11 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

1.12 *Bidder's Certifications*

A. The Bidder certifies the following:

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

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:

    a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.

    b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

    c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

    d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

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

Attest: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

_____

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

BID BOND (PENAL SUM FORM)

Bidder Name: Address *(principal place of business)*:	**Surety** Name: Address *(principal place of business)*:
Owner Name: **Cocopah Indian Tribe** Address *(principal place of business)*: **14515 S. Veterans Drive, Somerton, AZ 85350**	**Bid** Project *(name and location)*: **PH20-V61; WA17-25; East Cocopah Lift Station Renovation Project** **East Cocopah Indian Reservation, Yuma County, AZ** Bid Due Date:
Bond Penal Sum: Date of Bond:	

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

Bidder	Surety
_____ *(Full formal name of Bidder)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title:	Title:

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation will be null and void if:

    3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

    3.2. All Bids are rejected by Owner, or

    3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

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

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

8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.

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

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the

provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

NOTICE OF AWARD

Date of Issuance:

Owner: **Cocopah Indian Tribe**

Engineer: **Indian Health Service**

Project: **PH20-V61; WA-17-25**

Contract Name: **East Cocopah Lift Station Renovation Project**

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:

East Cocopah Lift Station Renovation IHS #Project PH-20-V61 WA-17-25: Construction of a new sanitary sewer lift station, approximately 90 linear feet (LF) of gravity sewer main diversion from the existing sanitary sewer system to the new sewer lift station wetwell, the installation of 55 LF of 6" sewer force main, two new sewer manholes, and sewer lift station electrical and SCADA monitoring units. The work also includes the demolition of the existing sewer gravity lines, wetwell and lift station; and electrical units and force mains.

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

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

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

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

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

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Copy: Engineer

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

This Agreement is by and between **Cocopah Indian Tribe** ("Owner") and **[name of contracting entity]** ("Contractor").

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

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

East Cocopah Lift Station Renovation PH-20-V61 WA-12-25: Construction of a new sanitary sewer lift station, approximately 90 linear feet (LF) of gravity sewer main diversion from the existing sanitary sewer system to the new sewer lift station wet well, the installation of 55 LF of 6" sewer force main, two new sewer manholes, and sewer lift station electrical and SCADA monitoring units. The work also includes the demolition of the existing sewer gravity lines, wetwell and lift station, existing sanitary sewer bypass; and electrical units and force mains.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: East Cocopah Sewer Lift Station Renovation. Cocopah Public Works has identified a need to replace the existing lift station wet well, replacing the discharge piping, above-ground piping, valves, pump rails, backup generator, the control panel and associated components.

ARTICLE 3—ENGINEER

3.01 *The Owner has signed a Memorandum of Agreement with the Indian Health Service to provide engineering and other technical advisory services. As a sovereign entity, Owner retains decision making authority in the execution of this Contract.*

3.02 The part of the Project that pertains to the Work has been designed by the OWNER's Consultant and with consultation from the *Indian Health Service.*

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.

4.03 *Contract Times: Days*

A. The Work will be substantially complete within **150** *calendar* days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the

General Conditions within **180** *calendar* days after the date when the Contract Times commence to run.

4.05 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner $**800** 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 $**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.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

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

B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Bid Table
East Cocopah Lift Station Renovation Project
Project #PH-20-V61 WA-17-25
Yuma County, Arizona

DIV	Description	Spec Section	Quantity	Units	Unit Cost	Line Item Cost
1	**GENERAL REQUIREMENTS**					
	Mobilization / Demobilization	TP-01	1	L.S.		
2	**CONCRETE**					
	Lift Station Site					
	Wet Well Base and Concrete Column	TP-02, TP-03, Sheet P2	18.1	C.Y.		
	Wet Well Cover Concrete Pad	TP-02, TP-03, Sheet C3, P2	144	S.F.		
	Force Main Discharge Piping Concrete Pad	TP-02, TP-03, Sheet C3, P2	80	S.F.		
	Electrical Rack Concrete Pad	TP-02, TP-03, Sheet C3, D5	77	S.F.		
	Backup Generator Concrete Pad	TP-02, TP-03, Sheet C3, E4	147	S.F.		
6	**GRAVITY SANITARY SEWERS**					
	4'-dia 15' VD Manhole A1 – Material and Installation	TP-06.03B, Sheet C3, D1	1	EA.		
	8" PVC Gravity Sewer Main from MH A1 to Wetwell	TP-06.03A, Sheet P1	35	L.F.		
	4'-dia 11' VD Manhole A2 – Material and Installation	TP-06.03B, Sheet C3, D1	1	EA.		
	8" PVC Gravity Sewer Main from MH A2 to Wetwell	TP-06.03A, Sheet P1	55	L.F.		
42	**SEWAGE LIFT STATION**					
	Lift Station	TP-42, Sheet P2	1	L.S.		
	Lift Station Electrical	TP-42, Sheet E1 to E4	1	L.S.		
43	**SEWER FORCE MAINS**					
	6" Ductile Iron Sewer Force Main	TP-43.03 B, Sheet P2	55	L.F.		
	6" Sewer Force Main Gate Valve with Box	TP-43.03 E,F, Sheet C3	1	EA.		
	8" Gravity Sewer Gate Valve with Box	TP-43.03 E,F, Sheet C3	2	EA.		
60	**CHAIN LINK FENCING**					
	Chain-link Fence	TP-60, Sheet C3	30	L.F.		
	OTHERS					
	Erosion Control	Sheet C5	1	L.S.		
	TOTAL BID CONTRACTOR PRICE:					

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

C. Total of Unit Price Work (subject to final Unit Price adjustment) $**[number]**.

D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment (**e.g. - EJCDC C620 App for Payment (2018)**) on or about the **5th** day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. **90** percent of the value of the Work completed (with the balance being retainage).

1) If 50 percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

b. **90** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **100** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **200** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

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 all of the following:

1. This Agreement.
2. Bonds:
    a. Performance bond (together with power of attorney).
    b. Payment bond (together with power of attorney).
3. General Conditions.
4. Supplementary Conditions.
5. Specifications as listed in the table of contents of the project manual (copy of list attached).
6. Addenda (numbers **[number]** to **[number]**, inclusive).
7. Exhibits to this Agreement (enumerated as follows):
    a. **Bid Form with attachments**
8. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.
    d. Field Orders.
    e. Warranty Bond, if any.

B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:

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

8.02 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

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

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

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

Owner:

_____
(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: _____

PERFORMANCE BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **Cocopah Indian Tribe**	Description *(name and location)*:
Mailing address *(principal place of business)*:	**PH20-V61; WA-17-25; East Cocopah Lift Station Renovation Project, East Cocopah Indian Reservation, Yuma, AZ**
14515 S. Veterans Drive, Somerton, AZ 85350	Contract Price:
	Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

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.

Contractor as Principal	Surety
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____

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

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

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

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

    3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

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

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

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

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

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

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

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

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

11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

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

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: **None**

PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **Cocopah Indian Tribe**	Description *(name and location)*: **PH20-V61; WA-17-25, East Cocopah Lift Station Renovation Project, East Cocopah Indian Reservation, Yuma County, AZ**
Mailing address *(principal place of business)*: **14515 S. Veterans Drive, Somerton, AZ 85350**	Contract Price:
	Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

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.

Contractor as Principal	Surety
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond 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**

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

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

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's

decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by

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

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

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

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

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

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

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

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and

start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

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

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

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

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

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

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

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

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that

the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

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

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

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

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

1. does not conform to the Contract Documents;

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

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

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

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

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

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

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

ARTICLE 2—PRELIMINARY MATTERS

2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

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

2.02 Copies of Documents

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 Before Starting Construction

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

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

2.04 Preconstruction Conference; Designation of Authorized Representatives

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

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

2.05 Acceptance of Schedules

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 Electronic Transmittals

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

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

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

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

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

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

3.02 Reference Standards

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

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

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 Reporting and Resolving Discrepancies

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

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

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take

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

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

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

3.04 Requirements of the Contract Documents

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

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 Reuse of Documents

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

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

4.02 Starting the Work

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

4.03 Reference Points

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

4.04 Progress Schedule

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 Delays in Contractor's Progress

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
2. Abnormal weather conditions;
3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
4. Acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;
2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the

activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

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

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

5.01 Availability of Lands

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

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

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

5.02 Use of Site and Other Areas

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

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

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise;

(b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

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

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

5.03 Subsurface and Physical Conditions

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

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

3. Technical Data contained in such reports and drawings.

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

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

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

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

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

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 Differing Subsurface or Physical Conditions

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

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

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

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

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement

to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

    a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

    b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

    c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

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

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

    c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental

Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 Underground Facilities

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

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

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

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

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question

addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

   b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

   c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 Hazardous Environmental Conditions at Site

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

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

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

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

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

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition

and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

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

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 Performance, Payment, and Other Bonds

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

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 Insurance—General Provisions

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the

required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

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

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 Contractor's Insurance

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 Builder's Risk and Other Property Insurance

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 Property Losses; Subrogation

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

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 Receipt and Application of Property Insurance Proceeds

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 Contractor's Means and Methods of Construction

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at

Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 Supervision and Superintendence

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

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

7.03 Labor; Working Hours

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

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 Services, Materials, and Equipment

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.05 "Or Equals"

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

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

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

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

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

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

        4) is not objectionable to Owner.

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

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

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

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

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

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

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

a. will certify that the proposed substitute item will:

1) perform adequately the functions and achieve the results called for by the general design;

2) be similar in substance to the item specified; and

3) be suited to the same use as the item specified.

b. will state:

1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

1) all variations of the proposed substitute item from the item specified; and

2) available engineering, sales, maintenance, repair, and replacement services.

d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in

Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

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

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

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

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

7.07 Concerning Subcontractors and Suppliers

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or

otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

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

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 Patent Fees and Royalties

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer,

its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

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

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

7.09 Permits

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

7.10 Taxes

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

7.11 Laws and Regulations

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

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other

action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 Record Documents

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

7.13 Safety and Protection

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

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

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

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

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any

of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

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

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 Hazard Communication Programs

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

7.15 Emergencies

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

7.16 Submittals

A. *Shop Drawing and Sample Requirements*

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

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as

Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

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

C. *Engineer's Review of Shop Drawings and Samples*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two

resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

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

7.17 Contractor's General Warranty and Guarantee

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

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

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

2. normal wear and tear under normal usage.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

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

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

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

5. Any review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.

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

7.18 Indemnification

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly

employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 Delegation of Professional Design Services

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 Other Work

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 Coordination

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be

set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

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

8.03 Legal Relationships

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

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

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

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

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

9.02 Replacement of Engineer

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

9.03 Furnish Data

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

9.04 Pay When Due

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

9.05 Lands and Easements; Reports, Tests, and Drawings

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 Insurance

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 Change Orders

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 Inspections, Tests, and Approvals

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 Limitations on Owner's Responsibilities

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

9.10 Undisclosed Hazardous Environmental Condition

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 Evidence of Financial Arrangements

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 Safety Programs

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

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 Owner's Representative

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

10.02 Visits to Site

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or

as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 Resident Project Representative

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 Engineer's Authority

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

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

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

10.05 Determinations for Unit Price Work

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

10.06 Decisions on Requirements of Contract Documents and Acceptability of Work

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

10.07 Limitations on Engineer's Authority and Responsibilities

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

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

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

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

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

10.08 Compliance with Safety Program

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 Amending and Supplementing the Contract

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 Change Orders

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

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

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04

or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 Work Change Directives

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

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 Field Orders

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

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

11.05 Owner-Authorized Changes in the Work

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 Unauthorized Changes in the Work

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

11.07 Change of Contract Price

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:

1. A mutually acceptable fixed fee; or

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

a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;

c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and

11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 Change of Contract Times

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 Change Proposals

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

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

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

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

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

11.10 Notification to Surety

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

ARTICLE 12—CLAIMS

12.01 Claims

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 Cost of the Work

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

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

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in

connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Other costs consisting of the following:

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

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

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

    c. *Construction Equipment Rental*

        1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

        2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

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

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

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

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

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

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

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

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

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

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

13.02 Allowances

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

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

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

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 Unit Price Work

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

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

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

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

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

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

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

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

14.01 Access to Work

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

14.02 Tests, Inspections, and Approvals

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

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

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

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

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

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

Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 Defective Work

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 Acceptance of Defective Work

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

14.05 Uncovering Work

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

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

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 Owner May Stop the Work

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

14.07 Owner May Correct Defective Work

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include

but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 Progress Payments

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

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

C. *Review of Applications*

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

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

    a. the Work has progressed to the point indicated;

    b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

    c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

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

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

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

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

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

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

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

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

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

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

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

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

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

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

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

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

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

15.02 Contractor's Warranty of Title

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

15.03 Substantial Completion

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial

Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

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

15.04 Partial Use or Occupancy

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

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

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

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 Final Inspection

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work,

or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 Final Payment

A. *Application for Payment*

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

2. The final Application for Payment must be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents;

b. consent of the surety, if any, to final payment;

c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in

which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 Waiver of Claims

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

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

15.08 Correction Period

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;

2. correct such defective Work;

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

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

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

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

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

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

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 Owner May Suspend Work

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

16.02 Owner May Terminate for Cause

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 Owner May Terminate for Convenience

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in

connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 Giving Notice

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 Computation of Times

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

18.03 Cumulative Remedies

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

18.04 Limitation of Damages

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

18.05 No Waiver

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

18.06 Survival of Obligations

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

18.07 Controlling Law

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

18.08 Assignment of Contract

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

18.09 Successors and Assigns

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

18.10 Headings

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.3 Application for Payment

Amend the definition as follows:

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

SC-1.01.A.31 Progress Schedule

Amend the definition as follows:

Progress Schedule—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the time authorized under the Agreement.

SC – 1.01.A.51. Add the following new paragraph after Article 1.01.A.50:

Agency – This project is financed in whole or in part by the Indian Health Service Sanitation Facilities construction Program (IHS) pursuant to, 42 U.S.C. 2004a, Public Law 86-121, Indian Sanitation Facilities Act. The Agency for these documents is the Indian Health Service (IHS).

ARTICLE 2—PRELIMINARY MATTERS

No suggested Supplementary Conditions in this Article.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No suggested Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

No suggested Supplementary Conditions in this Article.

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

SC-5.06 Hazardous Environmental Conditions at Site

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

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

B. Not used.

ARTICLE 6—BONDS AND INSURANCE

SC-6.03 Contractor's Insurance

Add the following new paragraph immediately after Article 6.03.C:

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

1. Workers' Compensation, and related coverage under Paragraphs 6.03.A of the General Conditions:

a. State: Statutory
b. Applicable Federal
c. Employer's Liability
Bodily Injury, each Accident {$ 500,000}
Bodily Injury By Disease, each Employee {$ 100,000}
Bodily Injury/Disease Aggregate {$100,000}

2. Contractor's General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions which shall include completed operations and product liability coverage's and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:

a. General Liability {$ 250,000}
b. Each Occurrence
(Bodily Injury and
Property Damage) {$ 500,000}
c. Property Damage liability
Insurance will provide
Explosion, Collapse, and
Underground coverage's where applicable.

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

a. Bodily Injury:
Each Person {$ 200,000}
Each Accident {$ 500,000}
b. Property Damage:

Each Accident {$ 20,000}

c. Combined Single Limit of {$ 500,000}

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

SC – 7.05.A. Or Equals

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

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

SC – 7.07.B. *Or Equals*

Delete Paragraph 7.07.B in its entirety and insert the following its place:

[Deleted]

SC – 7.07.E. Or Equals

Amend the second sentence of Paragraph 7.07.E by striking out the following words:

Owner also may require Contractor to retain specific replacements; provided, however, that

SC – 7.07.N. Or Equals

Add the following new Paragraph immediately after Paragraph 7.07.M:

Contractor is required to perform at least 33 1/3% of the Work, measured as a percentage of the Contract Price, using their employees and equipment. Copies of Subcontract agreements may be required by the Engineer to verify the amount of work performed.

SC-7.15.B Emergencies

Add a new paragraph immediately after Article 7.15.A:

A. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and Owner. In addition, the Contractor must promptly report in writing to appropriate authorities and the Owner's representative all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the site, giving full details and statements of witnesses. If a claim is made by anyone against the Contractor or any SubContractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner giving full details of the claim.

ARTICLE 8—OTHER WORK AT THE SITE

No suggested Supplementary Conditions in this Article.

ARTICLE 9—OWNER'S RESPONSIBILITIES

SC – 9.01.A. Communications to Contractor

Amend the Paragraph 9.01.A to read as follows:

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

SC – 9.12.B. Safety Program

Add the following new Article immediately after Paragraph 9.12.B:

9.13 Owner's Site Representative

A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee.

9.14 Owner's Authority

A. Owner has the authority to reject Work if Contractor fails to perform Work in accordance with the Contract Documents.

B. Owner will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work.

C. Owner will seek technical advice of Engineer prior to making any decisions regarding the design, technical matters, or the Contract Documents."

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

SC – 10.01. Owner's Representative

Delete article 10.01.A in its entirety and insert in its place the following:

The Engineer, with assistance from Owner's Consultant, shall act as owner's technical advisor during the construction period of this Contract. If directed by the Owner, Contractor may submit copies (originals sent to the Owner) of information such as submittals, progress payments, change order requests, etc., to the appropriate IHS office when technical assistance is required and requested by the Owner. The Engineer will submit any and all recommendations to the Owner for its decision. All direction to the Contractor shall come from the Owner with the technical advice of IHS.

SC – 10.01. Owner's Representative

Add the following new paragraph immediately after Paragraph 10.01.A:

B. At the request of the Owner, IHS will provide oversight and technical assistance on Contractor submittals, progress payments, change order requests, and other project related information submitted by the Contractor and make recommendations to the Owner.

SC – 10.02. Visit to Site

Add the following new paragraphs immediately after Paragraph 10.06.A:

C. All discussions about the Contract with the Owner's Contractor that includes IHS employees and Owner's Consultant shall be conducted by and with direct participation of Owner's employees. The IHS may not make commitments or give direction to the Owner's Contractor. IHS employees cannot represent the Owner and Owner's employees cannot represent the IHS.

D. The IHS and Owner, with assistance from Owner's Consultants, shall inspect all sanitation facilities constructed through Tribal procurement to ensure construction meets contract specifications. The procurement documents shall also note that the IHS inspector does not have authority to modify the Contract or issue direction to the Contractor. Following construction inspection, the IHS will advise the Owner on whether the construction meets the IHS interpretation of the Contract requirements."

SC – 10.03. Resident Project Representative

Add the following language 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 Owner. RPR's dealings with Contractor will only be through or in presence of and with the full knowledge and approval of Owner. RPR's dealings with Subcontractors will only be through or in presence of and with the full knowledge and approval of Owner and Contractor. The RPR will:

1. Conferences and Meetings: Attend meetings with Owner and 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 Owner and Contractor. Working principally through Owner'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.10.03

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.

8. Represent the Owner.

E. Contractor should be advised of the fact that his Contract is with the Owner, with Federal oversight to ensure the Work complies with all applicable Federal requirements. IHS inspection will only confirm quality assurance for the Federal government and the Owner but their presence will not be inferred as quality control for the Contractor nor is implying any contractual relationship. IHS inspection of facilities constructed through Tribal procurement is only part of the Federal oversight responsibility."

SC – 10.04. Engineer's Authority

Delete Paragraph 10.04.A in its entirety and insert in its place the following:

[Deleted]

SC – 10.06. Decisions on Requirements of Contract Documents and Acceptability of Work

Amend Paragraph 10.06.A to read as follows:

Engineer will provide recommendations to Owner 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 making such recommendations, 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."

ARTICLE 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No suggested Supplementary Conditions in this Article.

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

No suggested Supplementary Conditions in this Article.

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

SC – 14.03. Defective Work

Amend Paragraph 14.03.B to read as follows:

Owner's Authority: Owner has the authority to determine whether Work is defective, and to reject defective Work, with technical advice of Engineer with assistance from Owner's Consultant.

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

No suggested Supplementary Conditions in this Article

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

No suggested Supplementary Conditions in this Article.

ARTICLE 18—MISCELLANEOUS

SC-18.07 Controlling Law

Amend Paragraph 18.07.A to read as follows:

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

SC-18.11 Tribal Sovereignty

Add the following new paragraph after Article 18.11:

Tribal Sovereignty

No provision of this Agreement will be construed by any of the signatories as abridging or any sovereign powers of the Tribe; affecting the trust-beneficiary relationship between the Secretary of the Interior, Tribe, and Indian Land Owner(s); or interfering with the government-to-government relationship between the United States and the Tribe.

SC – 19. Add the following language immediately after Article 18:

ARTICLE 19—FEDERAL REQUIREMENTS

SC-19.01 IHS Not a Party.

A. This Contract is expected to be funded in part with funds provided by the IHS. Neither the IHS, nor any of its departments, entities, or employees is a party to this contract.

B. IHS employees cannot represent the Owner and Owner's employees cannot represent the IHS.

SC-19.02 Contract Approval.

A. Approval by the IHS of the proposed Contract documents and costs is required before this contract is effective.

B. Approval by the IHS of proposed contract changes is required before they are effective.

SC-19.03 Conflict of Interest.

A. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest or other interest in or a tangible personal benefit from the Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

SC-19.04 Small, Minority, and Women's Businesses

A. Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms. If Contractor intends to let any subcontracts for a portion of the work, Contractor must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. Affirmative steps must include:

1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;

4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and

5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

SC-19.05 Anti-Kickback

A. Contractor shall comply with the Copeland Anti-Kickback Act (40 U.S.C 3145) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that Contractor or subcontractor must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. Owner shall report all suspected or reported violations to IHS.

SC-19.06 Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended

A. Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

SC-19.07 Equal Employment Opportunity

A. The Contract is considered a federally assisted construction contract. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

SC-19.08 Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)

A. Contractors that apply or bid for an award exceeding $100,000 must file the required certification. The Contractor certifies to the Owner and every subcontractor certifies to the Contractor that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining the Contract if it is covered by 31 U.S.C. 1352. The Contractor and every subcontractor must also disclose any lobbying with

non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Owner.

SC-19.09 Environmental Requirements. When constructing a Project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental conditions:

A. Waters of the U.S. –When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands or other Waters of the U.S.

B. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact or human remains shall be immediately reported to Owner and a representative of IHS. Construction shall be temporarily halted pending the notification process and further directions issued by IHS after consultation with the State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO).

C. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of IHS. Construction shall be temporarily halted pending the notification process and further directions issued by IHS after consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service.

D. [DELETED]

SC-19.10 Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708)

A. Where applicable, for contracts awarded by the Owner in excess of $100,000 that involve the employment of mechanics or laborers, the Contractor must comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, the Contractor must compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

SC-19.11 Debarment and Suspension (Executive Orders 12549 and 12689)

A. A contract award (see 2 CFR 180.220) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

SC-19.12 Davis – Bacon Act, as amended (40 U.S.C. 3141-3148)

A. If this contract is in excess of $2,000, the Contractor must comply with the requirements of the Davis – Bacon Act (40 U.S.C. 3141-3144 and 3146-3148) as supplemented by Department of Labor regulations (29 CFR part 5). In accordance with the statute, the Contractor must pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, the Contractor must be required to pay wages not less than once a week. The Owner must place a copy of the current prevailing wage determination issued by the Department of Labor in the solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination.

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner:	Cocopah Indian Tribe		
Engineer:	Indian Health Service		
Contractor:		Contractor's Project No.:	
Project:	PH20-V61; WA-17-25		
Contract Name:	East Cocopah Lift Station Renovation Project		
Date Issued:		Effective Date of Work Change Directive:	

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

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

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

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

Contract Price: $ _____ **[increase] [decrease] [not yet estimated]**.

Contract Time: _____ days **[increase] [decrease] [not yet estimated]**.

Basis of estimated change in Contract Price:

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

	Recommended by Engineer	Authorized by Owner
By:		
Title:		
Date:		

CHANGE ORDER NO.: [Number of Change Order]

Owner: Cocopah Indian Tribe
Engineer: Indian Health Service
Contractor: Contractor's Project No.:
Project: PH20-V61; WA-17-25
Contract Name: East Cocopah Lift Station Renovation Project
Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

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

Recommended by Engineer (if required)	Authorized by Owner
By: _____	_____
Title: _____	_____
Date: _____	_____
Authorized by Owner	Approved by Funding Agency (if applicable)
By: _____	_____
Title: _____	_____
Date: _____	_____

PAO/SFC TECHNICAL PROVISIONS (March 2019)

TECHNICAL PROVISIONS

SECTION 01 - TRENCH EXCAVATION AND BACKFILL FOR PIPELINES AND APPURTENANT STRUCTURES

TP - 01.01 SCOPE:

The work covered by this section includes the furnishing of all labor, tools, equipment, and materials and performing all operations in connection with the excavation, trenching and backfilling of all pipe lines, structures and accessories.

Excavation, as used in these specifications refers to all construction activities necessary to install subsurface utilities in accordance with the plans and specifications. Such activities include, but are not limited to:

A. All necessary clearing, grubbing and site preparation; removal of all materials that may interfere with construction activities (except existing pipe work, conduits, utility structures or other items to be left in place) to the lines and grades indicated on the plans and otherwise described herein.

B. Removal and/or storage of subsurface materials from trench and construction excavation areas to allow installation of designated utilities or structures. All suitable material removed from excavations shall be used, insofar as practicable, in the formation of embankments, fills and backfilling.

C. Preparation of sub-grades and backfilling of trench and construction areas upon completion of utility or structure construction.

D. All necessary bracing, shoring and protection (but not including tight sheeting in trenches and structure excavation ordered left in place by the Owner or Owner's Representative).

E. Final grading, dressing and cleanup of the construction site.

TP - 01.02 SAFETY - PROTECTION OF EXCAVATION, WORK AND PERSONS:

The Contractor shall provide safe working conditions at all excavations. All trench excavation shall be coordinated in strict accordance with current Occupational Safety and Health Standards (OSHA) - Construction Standards for Excavations (29 CFR Part 1926, Subpart P) issued by the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) as well as applicable state and local regulations. It is the Contractor's responsibility to become knowledgeable of the regulations and comply with all requirements contained therein.

Excavations and adjacent areas shall be inspected daily by an OSHA certified competent person provided by the Contractor for evidence of hazardous conditions. A record of these inspections shall be kept by the Contractor and be made available to the Owner upon request. Workers in excavations shall be protected from cave-ins. Protection can be by sloping and benching systems, support systems, shield systems, and/or other protective systems as described in the regulations. Only excavations which are entirely in stable rock or excavations which are less than five (5) feet in depth and, upon examination by a competent person, show no indication of potential cave-in are exempt from the requirement for cave-in protection.

A. Trenches: No material shall be placed within two (2) feet of the edge of the excavation. Where employees are required to be in excavations more than four (4) feet deep, an adequate means of exit such as a ladder or steps shall be provided and located so as to require no more than 25 feet of lateral travel. It is the Contractor's responsibility to become knowledgeable of the regulations and comply with all requirements contained therein. The total length of open trench shall not exceed 500 feet at any time. Trenches shall be completely backfilled at the end of each working day, unless otherwise approved by the Owner or Owner's Representative and appropriate protection is utilized.

B. Shoring and Sheeting Sections:

1. Protection of employees in excavations shall conform to applicable OSHA Standards. Any trench protection and modification to trenching safety plans shall be submitted to the Owner or Owner's Representative in writing to be maintained as part of the record.

2. The Contractor shall install all shoring and sheeting systems required to prevent cave-ins and protect employees, adjacent property, and adjacent structures in accordance with current OSHA standards. No extra payment will be made for these items, the cost thereof being merged with and considered a part of the cost for the related excavation.

3. Before sheeting is withdrawn, or trench boxes moved forward, they shall be raised, in place, just above the pipe crown to safely allow the Contractor to completely fill any voids left in the pipe zone.

C. Personal Protective Equipment: The Contractor shall ensure that all employees wear proper protective clothing during construction in accordance with the current OSHA standards. The following measures or provisions are to be adhered to at all times during the construction project:

1. Hard hats shall be worn by all personnel working on the site.

2. Safety shoes or boots will be worn by all personnel working on the site.

3. When appropriate, proper safety vest or fluorescent (yellow, green or orange) safety shirts shall be worn by all personnel working on the site

4. When appropriate, proper eye and hearing protection shall be worn by all personnel working on the site.

5. When appropriate, proper gloves shall be used by personnel working on the site.

6. All visitors to the project job site shall be required to wear proper hard hat and safety vest while on the job site. No unauthorized person(s) shall be allowed on the job site. Owner's Representatives on the job site for inspection or engineering consulting work shall wear all of the above listed personal protective equipment, as appropriate.

7. All heavy construction machinery, such as trenching machines, bulldozers, and backhoes, must be equipped with a roll bar and a back-up beeper meeting the requirements of the above referenced regulation.

TP - 01.03 WORK WITHIN RIGHT-OF-WAYS & TRAFFIC CONTROL:

All work within the right-of-way of a street, road, highway, or other public thoroughfare, including roads, sidewalks or trails, or work which requires encroachment into the right-of-way of a public thoroughfare, shall incorporate adequate signs, barricades, warning lights, and/or flagmen to ensure the protection of the work, protection of the workers, and the safety of the public. When performing any work within the right-of-way of roads or railroads, the Contractor shall comply with the right-of-way permit, as applicable, for the installation including all of the requirements for traffic control and compaction. All work within the right-of-way of roads shall be performed in accordance with the "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-14, Division 600" and/or local, municipal, state or other federal requirements as noted.

In addition, the Contractor shall submit a traffic control plan to the appropriate right-of-way controller and the Owner or Owner's Representative for review and approval prior to any work within the right-of-way of any roads or railroads. The plan shall be in accordance with any applicable encroachment permits prior to any work with the right-of-way of any road or land. Any deviation from the plan must be submitted for review and approval by the appropriate right-of-way controller and Owner or Owner's Representative. All open construction, obstructions, or other hazards left in place at the end of a work session shall be barricaded and marked by yellow warning lights, which shall be illuminated from sunset to sunrise. All signs, barricades, warning lights, and other

traffic control devices, and all traffic control activities shall be in accordance with the most recent edition of the Federal Highway Administration "Manual on Uniform Traffic Control Devices" (ANSI D6.1), OSHA regulations, and the requirements of the transportation department which owns or maintains the thoroughfare.

The Contractor shall at all times perform his work so as to cause the least possible inconvenience to the general public and the residents in the vicinity of the work, and to ensure the protection of persons and property in a manner satisfactory to the Owner.

No road or street shall be closed to the public except with the permission of the Owner and proper governmental authority. Private driveways shall remain open to the maximum extent possible. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times.

Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed except as approved by the Owner.

TP - 01.04 ROAD, RAILROAD AND SPECIAL UTILITY CROSSINGS (IF REQUIRED):

The Contractor shall be responsible for compliance with all requirements of special crossing permits applicable to this project. The Contractor shall provide copies of such permits prior to the commencement of work. If no crossing permits are appended, and such crossings are indicated on the plans, crossings will comply with all applicable provisions of Technical Provisions 11, in addition to those indicated under other provisions of this Technical Provision. At least two (2) working days' notice shall be given to the Owner or Owner's Representative before work is done on any crossing.

TP - 01.05 DRAINAGE:

The Contractor shall control the grading in the vicinity of the excavation so that the ground surface is properly sloped to prevent water from running into the excavated areas. Water that has accumulated in the excavation from rainfall and/or surface runoff, or from any other cause which might have been prevented by proper care and foresight, shall be removed and the subgrade restored to its proper bearing capacity prior to commencing construction activities, all at the Contractor's expense.

TP - 01.06 PROTECTION OF EXISTING UTILITIES:

The Contractor shall call and utilize the appropriate underground service location company to mark existing utilities within the project area. It shall be the Contractor's responsibility to determine the locations of existing underground utilities including, but not limited to, gas lines, fiber optic lines, telephone lines, pipelines, and drainage lines (storm drains, channels and ditches), not shown on the plans and to confirm the exact locations of those existing utilities shown on the plans. Existing utilities shall be protected from damage during excavation and backfilling of trenches, and if damaged, shall be repaired or replaced at the Contractor's expense. Broken water lines must be cleaned, disinfected, and flushed in accordance with AWWA C651 before being returned to service.

Continuation of the excavation shall not be permitted until damaged utilities have been repaired to the satisfaction of the Owner and the respective utility company. It shall be the Contractor's sole responsibility to protect or remove and replace any or all culverts as required for the satisfactory performance of the work.

TP - 01.07 LOCATING FACILITIES FOR INSTALLED SANITATION FACILITIES:

A. Warning Tape and Tracer Wire:

1. Warning Tape: Warning tape shall be installed 18-inches directly above the crown of the water, sewer, electrical, or other pipe with the printed side up. The warning tape shall also be installed as continuous skirting at the exterior of manholes, valve boxes, or other installed apparatus. For water pipes (mains and service lines), the warning tape shall be BLUE in color with "CAUTION: BURIED WATER

LINE BELOW" continually printed on it. For sewer pipes (mains and service lines), the warning tape shall be GREEN in color with "CAUTION: BURIED SEWER LINE BELOW" continually printed on it. For electrical lines, the warning tape shall be RED in color with "CAUTION: BURIED ELECTRICAL LINE BELOW" continually printed on it. The tape shall be minimum 3-inches wide, 5 mils total thickness and composed of plastic with a metal foil core. Where tracer wire is buried with the pipe line, the locator/warning tape may be plastic without metal foil.

2. Tracer Wire: For water mains and water service lines. Direct bury 10 AWG copper clad steel wire as manufactured by Copperhead Industries, LLC, or direct bury 10 AWG solid copper wire as manufactured by Agave Wire LTD, minimum 261-lb break load with 30 mil High Molecular Weight Polyethylene jacket, blue color, or approved equal. The tracer wire shall be attached to the pipe a minimum of three (3) times for each pipe length.

   a. The tracer wire shall be securely bonded together with an approved underground waterproof splice kit at all wire joints to provide electrical continuity, and it shall be accessible at all trace wire access points. The underground waterproof splice kit shall be equal to 3M Direct Bury Splice Kit DBR/Y-6. If tracer wire is installed, the Contractor shall provide (2) extra Underground Waterproof Splice Kits to the operating utility.

   b. Tracer wire access points shall be Copperhead SnakePit Roadway as manufactured by Copperhead Industries, LLC or approved equal. Materials used to construct lid and tube shall be non-corrosive or corrosion resistant. Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements. Lid material shall be of cast iron or ductile iron and color-coded according to American Public Works Association (APWA) standards. Blue designates water, and green designates sewer. Spacing between tracer wire access points shall be indicated on the plans or as specified be the Owner.

      Tracer wire shall be connected securely to the direct connection hook-up point. Soil around the access box shall be properly compacted. The top of the access box shall be installed to finished grade. Slope final grade away from box for drainage.

   c. All tracer wire shall be tested for continuity after installation in the presence of the Owner's Representative. Tracer wire shall be repaired or replaced, as necessary, until continuity is achieved, at no additional cost to the Owner.

B. Utility Line Markers, Bollards, and Metal Marker Posts: Retroreflective tape shall be installed around the utility line markers, bollards, and metal marker posts according to the manufacturer's recommendation. Tape placement shall be approximately 6-inches from the marker top as shown on details. The 6-inch tape shall be 3M High Density Yellow Pressure Sensitive or approved equal. Concrete shall meet the requirements of TP 02.

   1. Utility Line Marker: Shall be a minimum of 66 inches in length and 3-3/4 inches in width. The utility marker may be installed within the ROW if approved by the Owner or Owner's Representative. The location and frequency of the utility line markers is indicated on the plans. The utility line markers shall be installed directly over the item that it is marking with an anchor barb bury depth of 18-inches.

      a. Water markers shall be blue in color, model CRM306608 with anchor barb and "CAUTION WATER PIPELINE" text on the marker as manufactured by Carsonite Composites, or equal.

      b. Sewer markers shall be green in green, model CRM306607 with anchor barb and "CAUTION SEWER PIPELINE" text on the marker as manufactured by Carsonite Composites, or equal.

   2. Bollards: Bollards shall be 78 inches long with a four (4) inch diameter post. They shall be installed to leave 48 inches exposed above ground.

      a. The four (4) inch diameter posts shall be aluminum or steel pipe filled with concrete. Bollards shall be painted with a minimum of two (2) coats of yellow paint designed for outdoor commercial

use. Bollards shall be properly cleaned and the surface prepared in accordance with the paint manufacturer's recommendations prior to painting. Under no circumstances shall bollards be installed within the right-of-way of any roadways, unless specifically indicated on a right-of-way permit or as approved by the right-of-way controller.

b. Set bollards in 12-inch diameter holes full of concrete. Set depth of bollard in 30-inches of concrete according to the detail drawing. Posts shall be set in a vertical position, plumb, in line and centered in the footing. Six (6) inches of concrete shall be placed under the post and concrete shall extend two (2) inches above grade and be crowned to shed water. Forms are not required, but may be used.

3. Metal Marker Posts: Markers shall be 66 inches long, 2-1/2 inches diameter, concrete filled, with a two (2) inch diameter stampable aluminum or brass cap. The cap shall be Berntsen Model CD2L, or approved equal. Metal marker posts shall be installed to leave 36 inches exposed above ground.

a. The 2-1/2 inch diameter aluminum or steel utility markers with stampable aluminum or brass caps shall be installed to mark the location of all marked facilities. Marker posts shall be painted with a minimum of two (2) coats of yellow paint designed for outdoor commercial use. The marker posts shall be properly cleaned and the surface prepared in accordance with the paint manufacturer's recommendations prior to painting. Under no circumstances shall metal marker posts be installed within the right-of-way of any roadways, unless specifically indicated on a right-of-way permit or as approved by the right-of-way controller.

b. Set metal marker posts in concrete in 10-inch diameter holes and depth of metal marker post in concrete of 30 inches. Posts shall be set in a vertical position, plumb, in line and centered in the footing. Six (6) inches of concrete shall be placed under the post and concrete shall extend two (2) inches above grade and be crowned to shed water. Forms are not required, but may be used.

TP - 01.08 EXCAVATION:

All excavation, other than by drilling and blasting, undertaken with the excavation equipment commonly used in the industry for this type of excavated material shall be classified as common excavation.

All excavation shall be made by open cut method except as approved or specified. During excavation, materials suitable for backfill shall be neatly piled no closer than 24-inches from the edge of the excavation. All materials not required or not suitable for backfill shall be removed and wasted at locations designated by the Owner or Owner's Representative.

A. Width: The sides of all trenches for the installation of utility piping systems shall be as nearly vertical as soil conditions will permit from ground level to the pipe. Except for the trenching of 1-inch water service lines, the width of the trench shall not be less than 16-inches nor more than 24-inches wider than the outside diameter of the pipe barrel. Trench excavation shall be centered on pipe alignment such that a minimum clear space of eight (8) inches is provided on each side of the pipe. Trench width above the level of the top of the pipe may be as wide as necessary for shoring or sheathing and for proper installation of the work.

B. Depth: The trench shall be excavated to the depth that permits pipe to be laid at the elevations shown on the plans or with the required depth of cover specified by the Owner or Owner's Representative, such as below the frost line. Depth of cover shall be measured from the finished grade or the surface of the permanent improvement to the top of the pipe barrel.

C. Preparation: The bottom of the trenches shall be accurately shaped to line and grade and shall provide uniform bearing and support for each section of the pipe on specifically placed bedding material at every point along its entire length. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and shall be only of such length, depth and width as required for properly making the

particular type joint. Care shall be taken not to excavate below the depths indicated. Unauthorized over depths shall be backfilled with suitable bedding material at the Contractor's expense.

D. Previous Excavation: If the trench passes over a sewer or other previous excavation, the trench bottom shall (1) be compacted to provide support equal to that of the undisturbed native soil or (2) conform to the specific regulatory requirements that preclude damage to the existing installed facility.

E. Unstable Subgrade: Where soft, spongy or otherwise unsuitable material is encountered, which will not provide a firm foundation for pipe, the Owner or Owner's Representative will direct the extent to which removal and replacement shall be made with suitable material. Special pipe foundation material is NOT anticipated. However, if required, a price shall be negotiated between the Owner and Contractor for special pipe foundation material.

F. Underground Obstructions: The Contractor shall preserve intact any underground pipes, culverts or other utilities encountered during construction (except as hereinafter permitted) provided their location is such that they do not interfere with new pipelines or structures being installed. The Contractor shall notify all appropriate utility authorities of his construction schedule so they may be at the site to locate and protect their property. If any utilities or structures are accidentally broken or disturbed, they shall be replaced immediately to a condition at least equal to that in which they were found, all at the Contractor's expense.

Couplings used to repair water and sewer mains or service lines shall be approved by the operating utility and the Owner or Owner's Representative. The repair work shall be done in a manner acceptable to the Owner or Owner's Representative and the utility company. Any existing water or sewer services that will intersect or interfere with the new pipelines or structures shall be rerouted by the Contractor in the manner indicated by the Owner or Owner's Representative.

Existing water or sewer services from the mains to private property that interfere with trenching operations may be cut and replaced at the Contractor's option and expense, provided that users of such services are notified at least 2 hours in advance and that the use of such service shall in no case be interrupted for more than 4 hours, unless specifically permitted in writing by the user. Materials and construction for these items shall be as provided in other sections of these specifications. All new and existing water and sewer mains and water and sewer services shall be protected from freezing at all times during construction.

G. Rock: The inclusion of a bid item and estimated quantity for rock excavation in the Bid Schedule indicates that rock excavation is probable. However, the exclusion of this item from the Bid Schedule does not preclude the possibility that rock will be encountered; it merely indicates that it is not anticipated. If unanticipated rock excavation is needed , the Contractor and the Owner will negotiate a price for the rock excavation.

Should rock excavation be required, it shall be the responsibility of the Contractor to have an experienced powderman handle all blasting and be able to furnish proof of credentials to the Owner. The Contractor shall comply with all laws, ordinances, applicable safety code requirements and regulations relative to the handling, storage and use of explosives and the protection of life and property. The blasting Contractor shall be licensed by the state in which the blasting is conducted. Blasting shall be conducted in accordance with OSHA guidelines. All necessary permits shall be secured and submitted to the Owner or Owner's Representative. The Contractor shall protect all adjacent utilities lines, property and structures from the blasting operation. The Contractor shall be responsible for any damage and injury caused by blasting operations. The Contractor shall inform all residents in the vicinity of proposed blasting activities and shall be responsible for any damage to persons or property as covered in the General Provisions.

Vibration Control (Ground Vibration) – Whenever vibration damage is possible, monitor each blast with a seismograph located, as approved, between the blast and the closest structure subject to blast damage. Peak particle velocity shall not exceed safe blasting recommended criteria, established by the Office of Surface Mining – OSM Alternative Blasting Level Criteria (Modified from Figure B 1, R1 8507 U.S Bureau of Mines.

Where blasting is required within 2,000 feet of any building, the blasts shall be covered with suitable weighted plank coverings or mats to confine all materials lifted by blasting. There shall be no blasting within 40 feet of the finished pipeline. The open end of the finished pipe line shall be closed and covered with earth to a depth 1 foot or greater before each blast. All charges shall be fired electrically. Erect suitable barricades and/or warning signs on all public thoroughfares leading to the site of blasting operations. Give adequate audible warning before each blast.

The Contractor shall repair any damages caused by rock excavation operations. The Contractor shall remove the excavated rock from the site unless otherwise directed by the Owner or Owner's Representative.

The following paragraphs define solid rock and loose rock excavation.

1. Solid rock shall be defined as large masses of igneous, metamorphic, or sedimentary rock that, in the opinion of the Owner or Owner's Representative, cannot be excavated without drilling, blasting, or the use of rippers or other specialized equipment. Any material excavated without the use of blasting or specialized ripping equipment shall not be considered solid rock.

   Solid rock excavation shall be measured in cubic yards from the top of the rock to a point 4-inches below the invert of the installed pipe and an assumed 24-inch trench width, regardless of the actual trench width and depth excavated. For structures, the rock shall be profiled at 12-inches outside the perimeter of the structure. The profile shall extend from the top of the rock down to the bottom of the rock to a maximum of 6-inches below the structure's footing. The rock volume shall be measured and computed by the Owner or Owner's Representative. The measurements shall be within the nearest 0.1-feet from the surface and no less than every 10-feet along the rock profile by one of the following methods:

   a. Excavating, ripping and exposing the rock profile for measurement, prior to any blasting. This shall be the responsibility of the Contractor and no additional payment shall be made for this excavation.

   b. Rock profile determined by drilling without excavating and measurements taken prior to any blasting.

   c. Rock profile measured after blasting and excavation. A 20% deduction shall be made in rock determination when this method is used to allow for expansion in ledge due to blasting.

2. Loose rock shall be defined as boulders and other detached stones each having a volume of one (1) cubic yard or more, but can be removed without drilling, blasting, or the use of a ripper or other specialized equipment. Loose rock shall be removed from the excavation in such a way that a clear distance of at least 4-inches exists between the rock and the bottom of the pipe, and 6-inches exist between the rock and the bottom of the structure. Loose rock shall not be used for backfill. Loose rock excavation shall be measured in cubic yards as the total volume of only those rocks or boulders that are individually over one (1) cubic yard in volume. The rock volume shall be confirmed with the Owner or Owner's Representative.

   A trench in which rock is encountered shall be excavated at least 4-inches deeper than the pipe invert and refilled to the required elevation with sand, gravel, or crushed rock passing a ¾-inch mesh screen. Bedding material shall extend upward at least 12-inches above the top of the pipe. Payment for this fill material shall be considered incidental to the rock excavation and no additional payment shall be made.

H. Structural Excavation: Excavation for structures (e.g., vaults, tanks, manholes, lift stations), shall extend a sufficient distance from walls and footings to provide for forming, except where concrete for walls or footings is authorized to be deposited directly against excavated surfaces. Care shall be taken to avoid

excavating below the depths indicated in the plans. Over-excavation shall be restored to proper elevation by filling with suitable granular bedding material at the Contractor's expense.

I. Removal of Nuisance Water: The Contractor shall remove and dispose of water entering the trenches and shall keep the trenches water free until the facilities are in place and sealed against the entrance of water. Use of a "trash" pump for removal of nuisance water shall be at no extra cost and shall not be considered dewatering. In no case shall water, earth, or any foreign materials be allowed to enter the water or sewer lines.

1. The removal of nuisance water is determined by pumping the water out of the trench with a heavy-duty 4 inch construction trash pump with a strainer for a minimum of 1 hour. The strainer shall be placed in a bed of pea gravel or a slotted PVC pipe in order to screen the debris.
2. All water removed from trenches shall be conveyed to natural drainage channels, storm sewers, or proper reservoirs as approved by the Owner or Owner's Representative. Such removal of water shall be in a manner that prevents property damage, erosion, or sedimentation.

TP - 01.09 DEWATERING:

The inclusion of a fee schedule item and estimated quantity for dewatering in the fee schedule indicates that dewatering is probable. However, the exclusion of this item from the bid schedule does not preclude the possibility that water will not be encountered, it merely indicates that it is not anticipated.

If continuous pumping with well points is required to maintain a satisfactory trench, and the Contractor is so directed by the Owner, this work shall be considered as dewatering. Well points shall be set separately for each trench being dewatered. Dewatering shall be based on the actual number of lineal feet of trench dewatered. Should dewatering not be included within the fee schedule, dewatering shall be paid for at the negotiated price between the Contractor and Owner.

TP - 01.10 SEPARATION OF WATER AND SEWER PIPELINES:

Water lines located near sewer facilities present conditions for potential cross contaminations. Protection from cross contamination can be provided by separation of the facilities and use of extra protection measures. For measuring separation, all measurements shall be the clearance between pipes and/or structures.

The angle of a water line and sewer line crossing shall be limited to between forty-five (45) degrees and ninety (90) degrees from parallel. Intersection angles of less than forty-five (45) degrees shall not be permitted.

Water lines and sewer lines shall not be constructed within a common trench.

For the purposes of this section, the term "lines" shall include mains, laterals, and service lines for both water and sewer.

A. Separation of Water and Gravity Sewer Lines: When water and sewer lines are laid parallel to each other, the horizontal distance between the water and sewer lines shall be at least 10 feet. Each line shall be laid in a separate trench.

When physical conditions, such as an existing obstruction, do not allow the required ten (10) foot horizontal separation, the water and sewer lines may be laid as close as five (5) feet if the bottom of the water line is at least 18 inches above the top of the sewer line.

If these requirements cannot be met, extra protection shall be required per section TP-01.10.F.

When water lines cross sewer lines, the water line shall be above the sewer line with no less than 18 inches vertical clearance.

Where a water line must cross under a sewer line, a 20 foot water pipe section shall be centered under the sewer line with a minimum vertical clearance of at least 18 inches between the bottom of the sewer line

and the top of the water line. New water and sewer lines being installed that are crossing, shall be arranged so that the pipe line joints of both the water and the sewer are equidistant and as far as possible for each line's joints.

If these requirements cannot be met, extra protection shall be required per section TP-01.10.F.

B. Separation of Water and Pressurized Sewer Lines: Water lines shall not be placed within ten (10) feet horizontal and within three (3) feet vertical above or below a pressurized sewer line.

Extra protection, as described in section TP-01.10.F, shall be required where a water line is placed within ten (10) feet horizontal and within three (3) feet vertical above a pressurized sewer line.

Extra protection, as described in section TP-01.10.F, shall be required where a water line is placed within ten (10) feet horizontal and any distance below a pressured sewer line.

C. Service Line Separation: Water and sewer services shall meet the horizontal separation requirements listed above, except where water and sewer services unavoidably must enter the building with less than 10 foot separation, the services shall diverge to achieve the required separation within 10 feet of the building wall. Water and sewer services crossing other service or mains shall meet the vertical separation requirements listed above.

If these requirements cannot be met, extra protection shall be required per section TP-01.10.F.

D. Water Main Separation from Sewer Manholes: No water pipe shall pass through, under, or come into contact with any part of a sewer manhole and shall be separated ten (10) horizontal feet from the closet edge of a sewer manhole.

If these requirements cannot be met, extra protection shall be required per section TP-01.10.F.

E. Separation between Water Lines and Components of the Sewage Disposal System: Water mains and water service lines shall meet the following minimum separation distances:

1. 10 feet to Sewer Manhole
2. 10 feet to Septic Tank
3. 25 feet to Septic Drainfield
4. 50 feet to Outhouse
5. 100 feet to Fence of Individual Lagoon
6. 500 feet to Fence of Community Lagoon

F. Extra Protection: When separation between water lines and sewer facilities cannot be accommodated, extra protection shall be required. Prior to the use of these extra protection measures, approval must be obtained in writing from the Owner.

New water lines that require extra protection from new sewer lines, shall have extra protection provided by using ductile iron pipe for one of the water or sewer lines. Lines of standard pipe length shall be centered at the point of crossing so that no joints exist within six (6) feet horizontal and only restrained or mechanical joints exist within 15 feet horizontal.

New water lines that require extra protection from existing sewer lines shall be constructed using the extra protection specified for new water lines, and the existing sewer line shall be encased in 6 inches around the circumference of the pipe of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal to ensure a water tight seal.

New water lines that require extra protection from existing sewer lines shall be constructed using the extra protection specified for new water lines, and the existing sewer line:

1. shall be reconstructed using a standard length of ductile iron pipe centered at the point of crossing so that no joints exist within six (6) feet horizontal and only restrained or mechanical joints exist within ten (10) feet horizontal, this shall include providing the necessary sewage by-pass means during construction as needed to prevent obstructing sewage flow in the existing line or.
2. shall be encased in 6 inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

Existing water lines that require extra protection from new sewer lines shall provide for extra protection by:

1. constructing the new sewer line and reconstructing the existing water line using ductile iron pipe for both lines with standard pipe lengths centered at the point of crossing so that no joints exist within six (6) feet horizontal and restrained or mechanical joints exist within ten (10) feet horizontal, or
2. encasement of both the existing water line and the new sewer line in six (6) inches of concrete for the horizontal distance of the lines that require extra protection but for a distance no less than ten (10) feet horizontal.
3. Extra protection for existing ductile iron water lines shall be met by the installation of restrained or mechanical joints on the existing water line within ten (10) feet horizontal of the crossing and either
    a) construction of new sewer line using a standard pipe length of ductile iron pipe centered at the point of crossing so that no joints exist within six (6) feet horizontal and restrained or mechanical joints exist within ten (10) feet horizontal, or
    b) encasement of the new sewer line in six (6) inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

Encasement of either the water lines or the sewer lines may be encased in a watertight carrier pipe that extends 10 feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be made of materials approved by the Owner or Owner's representative.

Installation of additional pipe or fittings or concrete for extra protection as required by the pipe alignment shown on the plans shall be incidental to the respective water or sewer line construction. Payment for unexpected utility crossings that require extra protection shall be negotiated between the Contractor and the Owner.

G. Polystyrene Insulation: Rigid extruded polystyrene insulation board shall have a minimum compressive strength of 25 psi. Width shall be 4-feet for mains 6-inch (nominal diameter) and larger and 2-feet for mains and service lines less than 6-inches (nominal diameter). Unless otherwise shown on the plans, the insulation board shall be installed 6-inches above the pipe and shall be a minimum of 2-inches thick.

TP - 01.11 BACKFILLING:

This section describes requirements for backfilling any excavation made to install buried pipeline, structure, or other item where structural fill is placed. It describes the material, placement, and compaction requirements.

A. Trenches and Pipes: Bedding and backfill materials to a depth of 12 inches above the pipe shall be carefully deposited in layers not more than six (6) inches thick (loose measurements), wetted to optimum moisture content, and hand or mechanically compacted. Fill used for this bedding and initial backfill shall meet the requirements set forth herein. The excavation material shall be placed in layers not to exceed 12 inches and compacted to the density specified in section TP-01.12 from 12 inches above the pipe to ground surface. Final backfill shall be left in a uniform, neat condition matching the surrounding grade.

B. Structures: Backfill materials shall be placed gradual and even to prevent tipping. Backfill shall be placed around structures with lifts not exceeding 12 inches and compacted to the density specified in TP-01.12. Backfill material shall meet the specifications identified herein. Generally, compact the fill in the same

manner as the standard trench procedure. Backfill compaction equipment should be suited for site conditions to avoid damage to installed structures.

Wherever trenches or surrounding structures have not been properly filled, or if settlement occurs, they shall be reopened to the depth required for proper compaction and refilled and re-compacted as specified and approved by the Owner or Owner's Representative at the Contractor's expense.

Compaction methods and equipment may utilize hand and mechanical tampers and rollers. The equipment and procedures proposed by the Contractor shall be appropriate for the respective soils and shall be subject to the approval of the Owner or Owner's Representative.

C. Materials: All backfill material shall be approved in advance of installation by the Owner or Owner's Representative. Materials shall be obtained from areas approved by the Owner or Owner's Representative.

Backfill material will not be paid for separately, but shall be considered as subsidiary to and a part of the cost for the applicable contract bid item.

1. Embedment: Embedment is that material from the bottom of the trench to 12 inches above the pipe, and includes the pipe bedding material (upon which pipe is placed), haunching material (extending from pipe bottom to pipe's vertical centerline), and initial backfill material (extending from pipe's vertical centerline to 12 inches above pipe). Native soil used for embedment must be free from clods of earth or stones larger than 3/4 inch in any dimension, organic refuse, debris, frozen soil, and other objectionable material. If native soil does not meet this criteria and cannot be screened to this criteria, the Contractor shall use imported material.

2. Imported Bedding Material: If required, special bedding material shall consist of sand, sandy gravel, or other suitable granular material having a maximum plasticity index of 6, with 100% of the bedding material smaller than 3/4 inches, and no more than 5% passing a No. 200 sieve. Contractor shall be responsible for the costs of any imported material.

3. Stabilization: Granular stabilization material shall be used to replace soft, spongy, or other unsuitable material, including rock encountered in excavation, to the depths necessary to support the pipe or structure. Stabilization materials shall be underlay bedding material (as applicable) and shall consist of suitable hard, durable granular material having a maximum size of 6-inches, graded so that a maximum of 20% passes a No. 4 sieve. Granular stabilization is not anticipated. If required, a price for granular stabilization shall be negotiated between the Contractor and the Owner.

4. Final Backfill: In general, final backfill will be that material originally excavated from the trench and will extend from 12 inches above the pipe to surface grade. Final backfill material shall be the same as that around the pipe except that the inclusion of a limited amount of stones up to 6 inches in diameter will be permitted.

D. Placement:

1. Embedment: Embedment shall be placed in 6-inch loose lifts and compacted as described herein. Care shall be taken to ensure that the pipe is not supported by the bells of the pipes.

   a) Bedding: Bedding is the fill material below the pipe. To remove stony soils, the Contractor shall excavate approximately 4 inches deeper than the required grade and bed the pipe with imported material. Bedding material is to be compacted to 90% of the maximum dry density as determined by the Standard Proctor density test (ASTM D-698).

      If over-excavation is required for removal of unsuitable native soils (weak structural soils), and bedding material is to be compacted to 95% of the maximum dry density as determined by the Standard Proctor density test (ASTM D-698).

b) Haunching: Haunching is the material from the bottom of the pipe to the vertical centerline of the pipe. The same material used for bedding the pipe shall be used for haunching. After the jointing is completed and the pipe has been approved by the Owner, the haunching material shall be placed by hand and worked under the pipe haunch to provide adequate side support for the pipe. The haunching shall be compacted to 85% of the maximum dry density as defined in TP Section 01.12. Placement and compaction of the haunching shall be achieved so as to avoid damage to or displacement of the pipe.

c) Initial Backfill: Initial backfill is the material from the vertical centerline line of the pipe to 12 inches above the top of the pipe. The same material used for bedding the pipe shall be used for the initial backfill. The initial backfill shall be compacted to the density as defined in section TP Section 01.12. The Contractor shall carefully place and compact the initial backfill in such a manner that damage to or displacement of the pipe does not occur.

2. Final Backfill: Final backfill shall not be placed until the embedment material is placed and compacted to the maximum dry density as defined in section TP-1.12, and the Owner or Owner's Representative have inspected and approved the installation. Final backfill shall be placed in lifts not to exceed 12-inches unless otherwise approved by the Owner or Owner's Representative. Compaction shall be as defined in Section 01.12.

3. Backfill for Road Subgrade: Under existing and proposed roadways, to a distance of 10-feet on either side of the road, bedding and backfill materials shall be carefully deposited in layers not more than 6-inches thick, loose measurements, wetted to optimum moisture content and mechanically compacted as described in the Compaction Requirements, Methods, and Testing section. If applicable, the Contractor shall comply with local, municipal, county, state, and federal highway authority's roadway subgrade standards.

   a) In areas where pavement is to be replaced, or in roads that are to be paved, remove cobbles that may interfere with subgrade preparation. This shall include the backfill within 12 inches of the finished subgrade elevation. The upper 12 inch layer, forming the subgrade for pavements, shall be compacted to a density of at least 95% (ASTM D-698 - Standard Proctor Test). See Section 11 of the Technical Provisions where this is required.

   b) Cement slurry can be substituted for compacted native backfill and subgrade if approved by Owner or Owner's Representative. The cement slurry shall meet the requirements for slurry as provided in TP 02 and shall be placed from the concrete truck at a slump of 6 to 8 inches. Steel plates 5/8 inch thick are to be placed over the trench with at least 6 inches overlap on each side and edged with asphalt to prevent traffic movement. The concrete slurry shall be allowed to set for a minimum of 12 hours before completing the asphalt patch. Slurry can typically be installed from the trench bottom to ground surface and no intermediary subgrade material is required for placement of asphalt patch.

4. Where trenches cross roads, streets, or driveways, backfilling shall be completed immediately following excavation and inspection. No trenches across roads shall remain open overnight. All crossings shall be backfilled, compacted and open to traffic at the end of each day's work. Major road crossings shall be excavated and backfilled in half widths of the traveled way so that at least one-half of the roadway is open to controlled traffic at all times during the work.

5. Backfill Around Structures: Backfill around structures shall conform to the same requirements as those for backfill around piping in unpaved areas, unless more stringent requirements are indicated in other sections of these specifications.

TP - 01.12 COMPACTION REQUIREMENTS, METHODS AND TESTING:

A. Minimum Density: Unless otherwise specified by applicable permits initial and final backfill and gravel resurfacing shall be compacted to the following minimum requirements. The minimum acceptable percent of compaction is the in place dry density divided by the reference density times 100. Compacted soil shall also be at plus or minus 2% of optimum moisture content. Contractor shall contact the operating utility prior to obtaining water from the public water system.

TYPE	**LOCATION**	**REQUIRED COMPACTION**
I	Under any existing or proposed pavement, curb, gutter, sidewalk, roadway, shoulder, alley, slab, footing, canal embankment, or when within 2 feet of the above.	95%
II	Within any gas, electric, or telephone utility easement, or within any street or road right-of way outside the limits defined above as Type I.	90%
III	All other locations not defined above as Type I or Type II.	85% (or 100% of adjacent natural ground)

B. Reference Densities/Baseline Testing: The Contractor, at his expense, shall provide the reference densities for the various bedding and backfill materials used. All tests shall be performed by a certified soils testing laboratory approved by the Owner or Owner's representative. If reference to natural ground is used, a nuclear gauge may be used to measure the density of the natural ground.

The reference densities for compaction tests shall be established in accordance with ASTM D-698, Standard Proctor Test. The Contractor shall submit for approval a testing plan identifying proposed testing locations prior to the start of any excavation work. Contractor shall provide copies of the Standard Proctor Tests with 3 point minimum moisture versus density curves.

The Contractor shall coordinate the collection of soil samples for proctor testing with the Owner or Owner's Representative such that both parties are on-site during the collection of soil samples. This will ensure that enough samples are collected to provide for accurate density testing during construction by providing reference density for differing soil conditions within the project area. Should a change in soil be encountered at any point of the installation, a new sample shall be taken and additional test shall be conducted.

C. Methods: Mechanical compaction is permitted. Water jetting methods are not permitted. The backfill shall be uniformly moistened to optimum moisture content, placed in sufficiently thin layers to obtain the specified results, and compacted with hand and/or pneumatic tamping rammers, vibrating plate compactors, sheepsfoot rollers, compaction wheels, hydrohammer, or other device(s) which will obtain the specified density for the particular soil type, without injury to the pipe or related structures.

D. Density Tests: Backfill density tests shall be performed in accordance with the latest versions of ASTM D-1556 (Sand Cone Method), ASTM D-2167 (Rubber Balloon Method), ASTM D-2216 (Moisture Content), ASTM D-2922 (Nuclear Density), and ASTM D-3017 (Nuclear Moisture Content). The Contractor will perform initial field density tests for each location listed in the next paragraph at the expense of the Contractor. Results of the test shall be provided to the Owner and approved prior to continuing. Any additional tests due to failure of initial tests shall be at the expense of the Contractor.

E. The Contractor will perform at least one (1) compaction test at each Type I or II location as defined in TP-1.12. Compaction tests shall be performed at a minimum of five hundred (500) linear feet of trench at Type II or III locations as defined in TP-1.12 and in accordance with the approved Contractor's testing plan as specified above in 01.12.B or as determined by the Owner. The exact test locations shall be

specified by the Owner's Representative. The Owner may request performance of additional tests at the Owner's expense.

If the results of any of the compaction tests indicate insufficient compaction, the area in question shall be reopened to a depth required for proper compacting, then refilled, compacted and retested, at the expense of the Contractor, until the compaction tests indicate that the necessary compaction requirements have been met. Two copies of the test results of any retesting performed by the Contractor shall be provided to the Owner, for his approval, prior to any permanent surfacing. Any improperly placed backfill, or locations where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted at the expense of the Contractor. The surface shall be restored and resurfaced, if necessary to the required grade.

TP - 01.13 ROADWAY RESTORATION AND PATCHING:

Whenever existing roadways or driveways are disturbed during the normal course of construction, the Contractor shall restore the roads and driveways to their original condition. Surfacing shall be replaced where the roadway has gravel, concrete or asphaltic surfacing. The Contractor shall comply with the standards and construction requirements of the applicable local, municipal, county, state and federal highway authorities, as noted on the plans, special provision or exhibits/crossing permits in this contract. The Contractor shall observe all prescribed traffic safety regulations.

A. Repair of the road shall be complete with adequate subgrade compaction and acceptable restoration of the roadway surface, as specified herein. No scarring of pavement will be allowed from excavation equipment tracks, outrigger shoes or other stabilizers.

Gravel used in regraveling and road base shall be well graded and conform to the following:

SIEVE SIZE	% PASSING
1-1/4	100
#4	38-65
#8	25-60
#30	10-40
#200	3-12

B. All cuts in the pavement between pavement that is to remain and pavement that is to be removed shall be cut straight leaving a clean regular and vertical edge. This edge shall be protected throughout the work, or shall be re-cut before placing the final surfacing material. After the pipe is installed, compacted backfill shall be placed to within 9 to 12 inches of the level of the roadway surface, as applicable.

1. Reinforced Concrete Patch: Compacted aggregate base course, six inches in depth, shall be placed in the roadway immediately beneath the concrete patching. The cut shall be filled with a six inch thick reinforced concrete patch. Concrete shall meet the requirements of Section 02-Concrete. The reinforcement shall be #6 welded wire reinforcement mesh (6-inch by 6-inch). The concrete patch shall be a minimum of four feet wider than the top of the trench and centered over the trench. The Contractor shall notify the Owner at least 48 hours before concrete is poured to allow the Owner or Owner's Representative to inspect patch preparation.

2. Asphalt Patch: Compacted aggregate base course, six inches in depth, shall be placed in the roadway immediately below a bituminous wear course. Asphalt mix surfacing conforming to ASTM D-3515 (Hot-Mixed, Hot Laid Bituminous Paving Mixtures) shall be placed and compacted in accordance with the detail to make the crossing level with the existing roadway. Cold mix is not permitted as a permanent asphalt patch.
3. Regraveling: Where regraveling is required after crossing of the existing roads or driveways, the Contractor shall remove existing gravel surfacing, stockpile the material, and restore the road surface after installation of the pipe. The stockpiled material shall be used for backfilling to within two inches of finished level. The final two (2) inches of gravel surfacing shall conform to the requirements of gravel for re-graveling as listed above in TP 01.13.A. This material shall be placed only in the amount and at the locations designated by the Owner or Owner's Representative. All quantities shall be verified by the Owner or Owner's Representative during placement of the gravel.

TP - 01.14 DISPOSAL OF EXCESS MATERIAL:

Excess material, including rock, broken concrete, bituminous materials, debris, or other materials not suitable for backfill, shall be removed from the site and wasted in the disposal areas selected by the Contractor and approved by the Owner or Owner's Representative.

The disposal of such excess materials will not be paid for separately, but shall be considered as incidental to and a part of the cost for the applicable contract bid item.

TP - 01.15 CLEAN-UP:

Upon completion of the work, the entire site shall be cleared of all debris, and ground surfaces shall be finished to smooth, uniform slopes, and shall present neat and workmanlike appearance. All slopes shall be trimmed and dressed, and all surfaces graded such that effective drainage is assured. Unpaved streets shall be graded smooth to the satisfaction of the Owner or Owner's Representative.

TP - 01.16 TRENCH MAINTENANCE:

The Contractor shall, for a period of one year after completion and final acceptance of the work, maintain, and repair any trench settlement that may occur and shall make suitable repairs to any pipe, pavement, or other structures that may become damaged as a result of backfill settlement.

TP - 01.17 STORM WATER POLLUTION PREVENTION PLAN (SWPPP):

For surface disturbances greater than one (1) acre in size, the Contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the latest requirements of the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Large and Small Construction Activities. The SWPPP must be prepared in accordance with good engineering practices and must 1) Identify all potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site; 2) Describe practices to be used to reduce pollutants in storm water discharges from construction site; 3) Assure compliance with the terms and conditions of the NPDES General Permit.

If the Contractor is not experienced in the preparation of SWPPP, the Contractor shall retain the services of a sub-consultant regularly engaged in the preparation of SWPPP to perform said service. The completed SWPPP must be approved by the Owner or Owner's Representative at least 10 business days before the start of construction so that a Notice of Intent can be sent to EPA.

The Contractor shall fully implement the SWPPP from the commencement of construction until final stabilization, as defined in the NPDES General Permit is achieved.

The Contractor shall maintain and update the SWPPP, as required in the NPDES General Permit, during construction. Updates shall include amendments required as a result of the ineffective controls discovered through the course of inspections or investigations conducted by the Owner or Owner's Representative, site staff, or by local, state, tribal or federal officials. The Contractor shall submit a Notice of Intent to EPA to obtain permit coverage, modify the coverage as necessary, and terminate permit coverage once final stabilization is achieved.

TP - 01.18 LINES AND GRADES:

The Owner or Owner's Representative will give all lines, grades and building locations on the plans and will supply the Contractor with the AutoCAD drawing to stake out the facilities to be installed. The Contractor shall be responsible for staking out pipeline centerlines with a lath every 200 feet or line-of-sight whichever is less. Bends, alignment, intersections, manholes, lift station centers and fence corners shall be staked by the Contractor and provided with two offsets for alignment. Elevation references will be provided as shown on the plans, for sewer lines, lift stations, vaults, tanks, sewer manholes, and other facilities where elevations are critical to the performance of the system. The Contractor shall be responsible for the preservation of the location and line and grade stakes when set, and if disturbed, shall have such stakes replaced.

TP - 01.19 CLEARING AND GRUBBING:

It is the Contractor's responsibility to clear and grub the site prior to or during construction. The Contractor shall remove all trees along the water and sewer main alignments in accordance with Tribal and local regulations. Proper approvals must be obtained as necessary prior to removing and disposal of trees and vegetation. Trees may either be chipped with a wood-chipper and placed over the trench for erosion control or disposed of at the Contractor's expense. Clearing and grubbing shall be done at the Contractor's expense.

TP - 01.20 FINISH GRADING:

After the structures have been constructed and installed, all piping installed, all required compaction and density testing has been performed and all backfilling and embankments have been completed, areas on the site of the work shall be brought to the true grades. All slopes shall be trimmed and dressed, and all surfaces graded such that effective drainage is assured. Final grading shall prevent water runoff from pooling around installed facilities. The Contractor shall leave each project site in a neat and orderly condition, restoring it as near as possible to its original condition and to the approval of the Owner or Owner's Representative.

TP - 01.21 SEEDING:

All disturbed areas shall be returned to their pre-construction vegetative state. The Contractor shall submit a seed mix that is equivalent to state highway or local road authority's approved seed mix. The Contractor shall protect the seed after it is placed with a tackifier, hay mulch, straw mulch, wood cellulose mulch, or as approved by the Owner. A minimum of 20 pounds of seed per acre shall be placed. Seed shall be placed by either drill seeding at a depth of approximately one (1) inch or broadcast seeding. If broadcast seeding is utilized, the Contractor shall apply twice the minimum seeding rate (i.e. 40 pounds of seed per acre). The Contractor shall perform maintenance as needed to ensure that adequate vegetative growth and stabilization has taken place to minimize erosion after construction is completed.

TP - 01.22 RECORD DRAWINGS:

The Contractor shall be responsible for keeping accurate records of all installed items under sections of the Technical Provisions package. These records shall indicate revised changes ("red-lines") of the construction drawings in sufficient detail to be accepted by the Owner or Owner's Representative for record drawings. Sufficient detail under this contract means that the Contractor shall take accurate measurements and record them on the drawings to provide the minimum information of at least two swing ties and distances to permanent objects. These permanent objects shall include but not be limited to all: valves, pressure reducing valves, air and vacuum valves, meters, curb stops, hydrants, connections to other lines, bends, marker posts, manholes, fence corners,

inspection ports, water and sewer tapping points, cleanouts, septic tank access covers, drainfield extents, intersection with other utilities, connection to existing utilities or home, roadway crossing locations, abandoned facilities, and depths of noted facilities; the beginning and end of any stabilization material placed; the beginning, end, and depth of rock encountered; the beginning, end, and depth of any encasement installed; and the location and depth of any each utility encountered. Further information on record drawings may be contained in the Supplementary Conditions.

The recording of the as-built information is considered an integral part of the progress of this construction and shall be reviewed with the Owner and Owner's Representative in determining progress under this contract. Record drawings shall be submitted by the Final Inspection and before final payment can be made.

TP - 01.23 MEASUREMENT AND PAYMENT:

Except for the following items, the cost of all work done by the Contractor as required under Section 01 of the Technical Provisions shall be merged with the pay items defined within the Measurement and Payment portions of other Technical Provisions of this contract.

A. Solid Rock Excavation: Payment for rock excavation shall be at the unit price listed in the Bid Schedule based on the computed number of cubic yards removed. Separate payments will be made between solid and loose rock excavations.

B. Loose Rock Excavation: Payment for loose rock excavation shall be at the unit price listed in the Bid Schedule based on the computed number of cubic yards removed. Separate payments will be made between solid and loose rock excavations.

C. Imported Bedding Material: If imported bedding material is required as fill to replace stony soil (stones less than 1 cy), it shall be considered incidental to pipe installation and no separate payment shall be made. If imported bedding material is required to replace unsuitable native material (weak structural properties), payment shall be at the unit price shown on the Bid Schedule based on the volume of compacted bedded material as computed by the Owner or Owner's Representative. Payment shall include the necessary over-excavation and the furnishing, installing, grading and compaction of the bedding. No payment shall be made for any imported material not approved by the Owner.

D. Dewatering: Dewatering shall be based on the actual number of lineal feet completed. Payment for dewatering shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete dewatering installation.

E. Mobilization/Demobilization: Payment for mobilization/demobilization shall be at the unit price listed in the Bid Schedule. 60% of this line item may be requested upon complete mobilization to the job site and the remaining 40% may be requested upon demobilization from the job site.

F. Storm Water Pollution Prevention Plan: Payment for the preparation and implementation of the SWPPP shall be paid on a lump sum basis as shown on the Bid Schedule. Payment shall be full compensation for plan preparation including required revisions for Owner's acceptance, updates to the SWPPP during construction, permit application, inspections, installation and maintenance of controls, modification of controls as determined by inspections, removal of pollutants due to failed controls, and permit termination.

G. Seeding: Seeding shall be paid for on a lump sum basis to seed the site in accordance with these specifications. Payment for seeding shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for complete installation.

H. Exploratory Time: Exploratory time shall be measured on an hourly basis for an actual period spent on locating the existing utility line exceeding two (2) hours. Contractor shall follow these steps:

1. Call the representative from the operating utility and make every effort to locate the existing utility line prior to excavation.
2. Locate the existing utility line for two hours at the Contractor's expense.
3. If the Contractor is unable to locate the existing utility line within two hours, the Contractor shall notify the Owner or Owner's Representative and both agree upon a start time. The start time shall be recorded. When the Contractor locates the existing utility line, the end time shall be recorded.

If the Contractor fails to notify the Owner or Owner's Representative when the Contractor will start locating the existing utility line, the Contractor will not be compensated. Payment for exploratory time shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for locating the existing utility line.

I. Record Drawings: The record drawings shall be submitted with or prior to submitting the final invoice and shall be reviewed and approved prior to making the final payment. Payment for this item shall be merged into the other pay items.

SUBMITTAL REVIEW FORM
SECTION 01 - TRENCH EXCAVATION & BACKFILL FOR PIPELINES AND APPURTENANT STRUCTURES

	DATE	INITIALS		
Received by ENGINEER:			Submittal No.	
Received by OWNER:			Project No.	
			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
1.02	Trench Safety Plan, including certified competent person		
1.03	Traffic Control Plan and Right of Way Permit		
1.07	Warning Tape		
1.07	Tracer Wire, Tracer Wire Access Points, and Tracer Wire Splice Kit		
1.07	Utility Line Marker		
1.07	Bollard		
1.07	Metal Marker Post and Stampable Cap		
1.08	Rock excavation methods (Solid and Loose)		
1.08	Blasting License, Credentials and Permits		
1.09	Dewatering procedures		
1.10	Extra Protection (Water Line or Sewer Line)		
1.11	Embedment and Bedding Material		
1.11	Stabilization Material		

1.11	Cement Slurry		
1.12	Soil Testing Lab		
1.12	Standard Proctor Test		
1.12	Density Testing Location Plan		
1.12	Density Test Results		
1.13	Gravel		
1.13	Pavement Patch Mix		
1.17	SWPPP		
1.18	Stake Out Plan, Survey Sub-Contractor		
1.20	Seed, Seeding Method, and Seeding Protection		

Approval:

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 02 - CAST-IN-PLACE CONCRETE

TP - 02.01 SCOPE:

Furnish all labor, materials, equipment, and incidentals as required, and perform all operations in connection with the placement of concrete in accordance with the applicable drawings and these specifications.

TP - 02.02 MATERIALS:

A. Cement: Portland cement shall conform to ASTM C150 Cement, Portland Type I, Type IA, Type II, Type IIA, Type III, or Type IIIA.

B. Concrete: Ready Mix Concrete shall conform to ASTM C94.

C. Aggregate: Aggregate shall be composed of clean, hard, durable, uncoated grains and crushed stone, free from detrimental amounts of clay, dust, soft or flaky particles, loam, shale, schist, slate, alkali, disintegrated stone, organic matter or other deleterious matter. The aggregates shall conform to ASTM C33.

D. Water: All water used for concrete shall be of potable quality.

E. Grading: Exposed horizontal surfaces shall slope approximately 1/8 inch per linear foot downward in all directions from the center.

TP - 02.03 CONCRETE REQUIREMENTS:

Property	**Unit**	**Minimum**	**Maximum**
Cement Factor	(sacks per cu. yd.)	6.0	---
Water-Cement Ratio	(gal. per sack)	---	6.0
Entrained Air	(percent)	4.0	6.0
Slump	(inches)	1.0	4.0
	Compressive Strength		
7 day	(psi)	1,800	
28 day	(psi)	3,000	

Concrete shall be uniformly plastic, cohesive and workable, i.e., can be placed without honeycomb and without voids in the surface. Workability shall be obtained without producing a separation of ingredients. Free water shall not appear on the surface. In general, a minimum amount of water required to produce a workable mixture shall be used.

TP - 02.04 WEATHER:

A. Freezing: No concrete work shall be done if the air temperature is below 40°F, except with the approval of the Owner or Owner's Representative. If approval is given to work, the water and aggregate shall be heated to at least 80°F before mixing. In all cases where the air temperature is predicted to be below 40°F, the concrete shall be insulated for at least 72-hours by insulating blankets, batt insulation with moisture proof covering, layers of dry porous material such as straw, hay, or multiple layers of impervious paper meeting ASTM C 171. No concrete shall be poured against frozen ground. The use of salt or other

compounds to prevent concrete from freezing shall not be permitted. Any work that has been injured by freezing shall be removed and replaced at the Contractor's expense.

B. Ambient Temperature Above 80 °F: The concrete temperature shall not exceed 95 °F, unless appropriate and approved admixtures are provided in the concrete mix. Concrete placement and finishing shall be completed as quickly as conditions permit. The concrete shall be protected against thermal shrinkage cracking due to rapid drops in concrete temperature greater than 40 °F during the first 24 hours. Acceptable protection materials to prevent these drops include: insulating blankets, batt insulation with moisture proof covering, layers of dry porous material such as straw, hay, or multiple layers of impervious paper meeting ASTM C 171. These materials shall not be applied until the concrete surface temperature has become steady or is beginning to decline.

TP - 02.05 CURING:

Fresh concrete shall be adequately protected from heavy rains and mechanical injury. All concrete shall be kept moist and protected from rapid drying or freezing for at least seven days. Concrete surfaces shall be kept moist by spraying with liquid membrane coating. Foundations and thrust blocks may be cured by covering with water saturated soil or backfill. All concrete shall be cured at least 72 hours prior to stripping forms or structural loading. Horizontal surfaces shall be covered with burlap as quickly as it can be safely applied, and then saturated by sprinkling. After 24-hours, burlap may be removed and water applied directly to the concrete surfaces. Suitable plastic covering may be substituted if no detrimental effects occur.

TP - 02.06 TRANSIT MIXED CONCRETE:

Ready-mixed concrete from a central batching plant and mixed in transit will be permitted with the Owner or Owner's Representative's approval. A time stamped plant batch certification sheet shall be provided by the concrete supplier listing the batch components for approval by the Owner or Owner's Representative.

TP - 02.07 FIELD TESTING:

Four test-cylinders shall be taken for each 50 cubic yards of concrete placed or portion thereof. If the Owner or Owner's Representative suspects, by visual inspection, slump, or other tests, that any other concrete appears substandard, additional test cylinders shall be required. The Contractor shall provide cylinder molds at the construction site and shall have the cylinders tested by an approved laboratory, with the Contractor bearing all costs. If any test cylinder falls below 3,000 psi at 28 days, this shall be sufficient cause to reject that portion of concrete. The Contractor shall remove and replace defective concrete with acceptable material at his own expense. The test cylinders shall comply with ASTM C31 for making and curing test specimens in the field.

The Contractor shall also perform one slump test and one air entrainment test for each ready-mixed concrete batch from a truck.

Field testing will not be required for non-structural concrete placement such as pre-cast manhole bases, concrete collars, yard hydrant concrete pads, fence post concrete anchors, monitoring well concrete pads, control panel concrete pads, cleanout collars, manhole collars, and drop manhole concrete encasements.

TP - 02.08 PLACING CONCRETE:

Before placing concrete, the Contractor shall provide 72-hour advance notice to permit proper inspection of forms and reinforcement by the Owner or Owner's Representative.

After completion of mixing, the concrete shall be rapidly conveyed to and deposited in the forms. Consolidate the concrete immediately after placing by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

Concrete shall not be placed against surfaces of absorbent material that are dry and concrete shall not be placed against surfaces that have free water. The concrete shall be placed in such a manner as to prevent excessive crawling and segregation of the aggregate. No concrete shall be used that has partially set before final placing, nor shall retempering of the concrete be permitted. All concrete shall be placed in the forms no more than 90-minutes after mixing.

TP - 02.09 FORMS:

The Contractor shall provide forms that will produce correctly aligned concrete. The centering of the forms shall be true and rigid and thoroughly braced both horizontally and diagonally. Forms shall be sufficiently strong to carry the dead weight of the concrete as a liquid without deflection, and tight enough to prevent leakage of mortar. The inside of forms shall be coated with an approved oil or thoroughly wetted. The Owner or Owner's Representative shall be notified prior to removal of form work.

The final concrete structure shall be inspected for alignment, elevation, and concrete quality. Final concrete structure alignment and elevation shall be checked by use of land surveying instruments.

Should the concrete structure alignment, elevation, and/or quality test results be determined unsatisfactory by the Owner or Owner's Representative, the entire structure or parts of the structure will be rejected. All further alignment or elevation corrections, or any concrete removal and/or replacement, shall be at the Contractor's expense.

Honeycombed and void areas in the concrete shall be removed and patched to produce a sound concrete product by a method selected by the Contractor and approved by the Owner or Owner's Representative.

TP - 02.10 MORTAR:

Mortar shall be made of one part masonry cement, three parts sand, and only a sufficient amount of water to make a workable plastic mix. Retempered mortar shall not be used.

TP - 02.11 GROUT:

Surface aesthethic grout with non-structural or adhesive properties shall be made of one part Portland cement, two parts sand, and only a sufficient amount of water to make a workable plastic mix. Re-tempered grout shall not be used.

TP - 02.12 SLURRY:

Concrete slurry used for road crossings shall meet the requirements of the Federal Highway Administration FP-14 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, Section 614 Lean Concrete Backfill.

TP - 02.13 MEASUREMENT AND PAYMENT:

Concrete and other work or materials required by this section shall not be measured and paid separately. Rather, they shall be included in the unit or lump sum bid prices of those items shown on the Bid Schedule that require the inclusion of such materials or work, even if not specifically mentioned within the measurement and payment sections of those particular pay items.

SUBMITTAL REVIEW FORM
SECTION 02 – CAST-IN-PLACE CONCRETE

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No. Manufacturer, etc.)	Action by Owner
2.04	Concrete Protection		
2.05	Concrete Compound		
2.06	Concrete Mix		
2.07	Concrete Testing Laboratory		
2.07	Strength, Slump, & Air Test Results		

	Signature	Date:
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 03 - REINFORCING STEEL

TP - 03.01 SCOPE:

Furnish all labor, materials, equipment and incidentals as required, and perform all operations in connection with the placement of reinforcing steel and wire fabric reinforcing, complete, in strict accordance with the applicable drawings and these specifications

TP - 03.02 MATERIAL:

Reinforcing bars shall meet the requirements of the Standard Specifications for Billet-Steel Bar (intermediate grade) for Concrete Reinforcement, ASTM A615. Welded wire mesh shall meet the requirements of the Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement, ASTM A185. The bars and wire mesh shall be placed in accordance with the approved shop drawings. Any excess rust or scale shall be removed by wire brushing prior to concrete placement. The use of cold twisted bars will not be permitted. Wire fabric shall be used only when specified and shall be the type shown on the drawings and approved by the Owner or Owner's Representative.

Tie wire size is shown in the plans and shall conform to ASTM A1064.

TP - 03.03 METHOD OF CONSTRUCTION:

All reinforcement shall be free from dirt, oil, paint, grease, mill scale and loose or thick rust. When bending is required, it shall be accurately done without the use of heat, and bars having cracks or splits at the bends shall be rejected. All reinforcement shall be placed in the exact position shown on the drawings, and shall be securely held in position by wiring to and blocking from the forms, and by wiring together at intersections, such that it will not be displaced during depositing and compacting of concrete. Precast concrete blocks, concrete masonry units, or metal chairs shall be used for supports where applicable. Rock supports will not be allowed.

Placing and fastening of reinforcement in each section of the work shall be approved by the Owner or Owner's Representative before any concrete is deposited in the section. All joints or splices shall be made by using approved clamps, welding or by lapping the ends of the bars a distance of at least 40 times their nominal diameters unless otherwise noted on the plans. Lap adjoining wire mesh by no less than one full mesh and lace securely with wire.

Cutting and bending, placement, welding, handling and storage, and installation of reinforcement shall be in accordance with applicable American Concrete Institution (ACI), American National Standards Institute (ANSI), and Concrete Reinforcing Steel Institute (CRSI) standards.

TP - 03.04 MEASUREMENT AND PAYMENT:

Reinforcing steel shall not be measured and paid separately. Rather they shall be included in the unit or lump sum bid prices of those items shown on the Bid Schedule that require the inclusion of reinforcing steel, even if not specifically mentioned within the measurement and payment sections of those particular pay items.

SUBMITTAL REVIEW FORM, SECTION 03 – REINFORCING STEEL

	Date	Initials		
			Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
3.02	ASTM chemical & physical test certificates		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 04 - WATER TRANSMISSION AND DISTRIBUTION MAIN

TP - 04.01 SCOPE:

The work covered by this Section consists of furnishing all labor, equipment and materials in connection with the construction of water mains, including piping, valves, hydrants, other appurtenances and connection of the water mains to the structures for community water systems, all installed in strict accordance with the plans and technical provisions.

TP - 04.02 GENERAL:

The waterlines shall be constructed in the locations and of the sizes, materials and pressure class shown on the plans, or as directed by the Owner or Owner's Representative. All permits, permissions or other authorizations required by the tribal or municipal utility authority for tapping and connection are the responsibility and cost of the Contractor. Excavation, trenching, backfilling, compaction and any needed dewatering shall be in accordance with Section 01 of these Technical Provisions. Staking, utility locates and existing system abandonment shall be conducted in accordance with Section 01 of these Technical Provisions.

Pipe joints, fitting and appurtenance installation shall be in accordance with the manufacturer's recommendations. All pipes and joints shall be approved by the Owner or Owner's Representative prior to backfilling. The work will not be accepted until satisfactory backfilling, compaction, testing and cleanup is complete. Final grading should prevent surface water runoff from pooling around installed facilities. If the work does not meet the specified requirements of this Section, the Contractor shall remove and replace and re-test, as necessary, at the Contractor's expense. The Contractor shall leave each premise in a neat and orderly condition, restoring it as near as possible to its original condition and to the approval of the Owner or Owners' Representative.

TP - 04.03 MATERIALS:

Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.

The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Handle pipe with padding between metal machinery and pipe. Keep dirt and foreign material away from pipe interiors and sealing surfaces. Lower pipe carefully into the trench without dropping, rolling or dumping the pipe.

A. General: Inspect all materials prior to installation to ensure that they are in new condition. Ensure that pipe, fittings and materials are free from defects and damage at the time of delivery and prior to installation in the trench. Plastic pipe with scratches, gouges, or grooves deeper than 10% of the wall thickness or ultraviolet discoloration shall be rejected. Remove all materials from site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications within 24-hours of discovery.

B. Pipe: All pipe shall be listed under the National Sanitation Foundation (NSF) Part 61. The standard pipe length shall be 20 feet. Each length of pipe shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, PVC Cell Classification, Type PSM PVC Sewer Pipe, ASTM Designation and Pipe Class.

1. Polyvinyl Chloride Pipe (PVC): PVC pipe shall meet the requirements of NSF 14.

a) PVC Pipe and Fittings (2-inch): PVC pipe shall be SDR 21 (200 psi). Each joint of pipe shall carry the NSF seal of approval for pipes for potable water. Pipe shall conform to ASTM D2241 and ASTM D1784. Fittings shall be 2-inch SDR-21 gasketed fittings with the PVC material

conforming to ASTM D1784, NSF 14, joints conforming to ASTM D3139, and gaskets (elastomeric seals) conforming to ASTM F477.

b) PVC Pipe and Fittings (4-inch to12-inch): PVC pipe and joints shall conform to the requirements of ANSI/AWWA C900 DR 18 or C909 DR18 pressure class 235 (minimum), Standard for Polyvinyl Chloride (PVC) Pressure Pipe, with gaskets meeting ASTM F477 joints conforming to ASTM D3139, and gaskets (elastomeric seals) conforming to ASTM F477 or as otherwise defined on the Bid Schedule.

c) PVC Pipe and Fittings (14-inch and larger): All 14-inch and larger PVC pipe shall conform to the requirements of AWWA C905 with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139 and gaskets conforming to ASTM F477.

2. Ductile Iron Pipe (DIP): All ductile iron pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51 for centrifugally cast ductile iron pipe. Pipe shall be manufactured in accordance with ANSI/AWWA C111/A21.11 for rubber gasket joints for ductile iron pressure pipe and fittings.

a) Pipe thickness shall meet the requirements of ANSI/AWWA C150/A21.50 for thickness design of ductile iron pipe.

b) Pipe shall be cement mortar lined and seal coated meeting the requirements of ANSI/AWWA C102/A21.4 for cement mortar lining for ductile iron pipe and fittings for water.

c) Pipe shall have push-on joints, unless otherwise indicated on the plans or in the Bid Schedule.

3. High Density Polyethylene Pipe (HDPE): All HDPE used in constructing the water main shall conform to Section 28 of these Technical Provisions.

C. Ductile Iron Fittings: Ductile iron fittings shall meet ASTM A536, 350 psi pressure rating for 2-inch to 24-inch diameter fittings in accordance with ANSI/AWWA C153/A21.53. Ductile and gray iron fittings shall conform to AWWA C110 and AWWA C111. Refer to manufacturer's recommendations for allowable deflection of fittings.

Flanged ends on fittings shall meet ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges. Fittings shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4 or shall be epoxy lined. Fittings shall be coated with an asphaltic seal coat on the outside only in accordance with ANSI/AWWA C153 and C104/A21.4 and referenced in ANSI/AWWA C153/A21.53. Gaskets shall be styrene butadiene rubber (SBR) meeting ANSI/AWWA C111/A21.11. Fittings shall have t-bolts and nuts manufactured of low alloy steel meeting ANSI/AWWA C111/A21.11 and ASTM A307. Fittings shall be listed under the National Sanitation Foundation (NSF) Part 61.

D. Mechanical Joint Restraints:

1. General: Mechanical joint restraints shall be manufactured of DI in accordance with ASTM A536 with the following additional requirements or exceptions. Joint restraint thrust bolts and nuts shall be ¾" low alloy (mild) steel. Mechanical joint restraints shall be incorporated into the design of a follower gland. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts in accordance with AWWA C111 and C153. A fully restrained joint shall have the same working pressure rating as the pipe itself.

2. Design: The restraint mechanism shall consist of numerous individually activated gripping surfaces to maximize restraint capability. The gripping surfaces shall be wedges that are designed to spread the bearing surfaces on the pipe. Twist-off nuts, sized the same as tee-head bolts, shall be used to ensure the proper actuating of restraining devices. When the nut is sheared off, a standard hex nut shall remain.

3. Pressure Rating: The mechanical joint restraint device shall be as listed below:

Type of Pipe	Sizes (Inches)	PSI	Safety Factor
DI	3 to 16	350	2
	20 to 36	250	2
PVC	Various	Equal to that of the pipe being used	2

4. Acceptable Models and Manufacturers:

Mechanical Joint Restraint – PVC Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Megalug 2000 PV Series	4 to 20
Sigma Corporation	One-Lok SLCE Series	4 to 20
Star Pipe Products	StarGrip 4000 Series	4 to 20

Mechanical Joint Restraint – DI Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Megalug 1100 Series	3 to 24
Romac Industries	RomaGrip	3 to 24
Sigma Corporation	One-Lok SLDE Series	3 to 12
Star Pipe Products	StarGrip 3000 Series	3 to 24
Uni-Flange (Ford)	UFR 1400 Series	3 to 24

Bell-Spigot Restraint – PVC Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Series 1500 TD	4 to 12
	Series 1500	4 to 12
Ford Meter Box	Ford 1390	4 to 12
Star	Series 1100	4 to 12

Bell-Spigot Restraint – DI Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
American	Fastgrip Gasket	4 to 16
EBAA Iron, Inc.	Megalug 1700 Series	3 to 20
	Series 1500 TD	4 to 12
Star Pipe Products	StarGrip 3100P Series	3 to 20
U.S. Pipe	Field Lok Gasket	4 to 16

Bolt-Through Mechanical Joint Restraint
Foster Adaptor

Hydrants and Valve Restraint – DI Pipe
Mueller Aquagrip Restraint Device

E. Gate Valves: Gate valves shall conform to the latest revision requirements of AWWA C509 or C515 for resilient-seated gate valves. All valves shall be equal to the AVK Series 25 or 65 or the American Flow Control Series 2500, or approved equal.

1. General:

   a) Gate valves shall be of cast iron or ductile iron body construction, bronze mounted, solid wedge, resilient seal, with a 2-inch square stem-operating nut, 200 psi operating pressure or higher, counterclockwise opening, inside screw, with O-ring seals.

   b) The Contractor shall provide to the Owner, at no additional cost, one gate valve wrench 6 foot long with "T" handle.

   c) Mechanical restraint joints shall be used unless otherwise indicated.

   d) When a valve is required near a fitting, such as a tee, the valve shall be secured with mechanical joint restraints to the fitting.

2. Markings: The name, monogram or initials of the manufacturer shall be legibly cast on the valve body. The make of valves furnished shall be easily identifiable by catalog numbers.

3. Valve Stems: All valves shall be furnished with valve stems made from 300 or 400 series stainless steel and shall be non-rising stems (NRS).

4. Lining: All interior ferrous surfaces exposed to fluid flow shall be epoxy coated to a minimum dry film thickness of 6 mils. Epoxy linings shall be factory applied by an electrostatic or thermosetting process in accordance with the manufacturer's printed instructions. The epoxy materials used shall be 100% powder epoxy or liquid epoxy that conforms to the requirements of AWWA C-550.

5. Coating: All exterior ferrous surfaces, except finished or bearing surfaces, shall be factory coated with two coats of asphaltic varnish conforming to Federal Specifications TT-V-51c, or shall be epoxy coated as required above for interior surfaces.

F. Gate Valve Boxes: All gate valves shall be provided with a $5^{1}/_{4}$-inch inner-diameter shaft, 2-piece sliding extension type cast iron valve box. The gate valve box shall be Tyler Union 6855 Domestic Heavy Duty, or approved equal.

1. General:

   a) All boxes shall extend from the body of the valve to the finished grade.

   b) The vertical column of the box shall be designed so that the top section may be adjusted while in position.

   c) The cast iron lid shall be 5-1/4" Domestic Heavy Duty Drop Lid with a pentagon nut and the word "WATER" cast on the lid.

   d) For the concrete collar, the concrete shall conform to Section 02 of the Technical Provisions and the reinforcing steel shall conform to Section 03 of the Technical Provisions.

2. Extension stems: When the valve operating nut is more than four feet below the top of the valve box, stainless steel extension stems equal to TROY VALVE Stainless Steel Valve Extension Stems shall be provided. The top of the extension shall be 3 ½ to 4 feet below the top of the valve box.

3. Debris Cap:

   a) Each valve box shall have a debris cap designed to prevent debris such as dirt and sand from passing around the cap and down into the valve housing and installed just below the valve cover.

   b) The cap shall be held in place by a mechanism which will not damage the valve housing.

   c) The cap must withstand, without slippage, a minimum vertical force of 50 pounds at a loading rate of 1 inch/minute.

   d) The debris cap and bottom of valve cover shall be separated by a minimum of 1 inch and not to exceed 2 inches.

   e) The cap shall be manufactured with corrosive-resistant material and fit the valve box's 5¼" diameter shaft. Caps shall be debris cap model number DC455 or DC457 manufactured by SW Services, LLC or approved equal. The debris cap shall be installed according to the manufacturer's recommendations.

G. Combination Air Valve: The valve shall have the features of both an air release and an air/vacuum release valve. The valve shall have either a single or dual body with a large orifice. The valve shall be an ARI D-040, or approved equal.

1. General:

   a) Size range of the valve shall be from 1-inch to 2-inch, or as specified on the design plans.

   b) The body and all operating parts shall be made of high strength corrosion-resistant materials.

   c) Working pressure shall be a minimum of 250 psi.

   d) The valve shall have the ability to automatically release small pockets of air during normal operation.

   e) The valve shall have the ability to automatically discharge or admit large volumes of air during filling and draining.

   f) Utility marker shall conform to Section 01 of the Technical Provisions.

   g) Concrete shall conform to Section 02 of the Technical Provisions and reinforcing steel shall conform to Section 03 of the Technical Provisions.

2. ARV Vault:

   a) Diameter of the vault shall be 48-inches or as shown on the design plans.

   b) Vault shall be composed of precast reinforced manhole barrel sections and shall have a 28-day compressive strength of at least 3,000 psi.

   c) Minimum height of sections shall be 24 inches. If two or more manhole sections are used to construct the vault, the joints between precast manhole sections shall be sealed with Ram Nek bituminous rope type sealer, or equal.

   d) The sections shall be grouted to a smooth finish on the interior and exterior of the manhole.

   e) Grout for jointing shall be as specified in Section 02 of the Technical Provisions.

   f) All connections between pipe and manhole walls shall be sealed with non-shrinking grout.

g) The depth of the vault from interior floor to the underside of the access hatch shall not exceed 48 inches.

h) If depicted on the plans, the drain pipe shall be 4-inch SDR 35 pipe. The pipe material shall transition to 4-inch DI pipe at the outlet end (10-foot minimum length) and where bury depth is less than 1-foot. Install #8 steel mesh at outlet end anchored with a 4-inch DI flange adapter and 4-inch DI rectangular accessory bolt pack kit.

3. Vault Concrete Collar and Vault Lid:

a) Concrete collar shall be reinforced with #4 steel hoops centered horizontally and vertically.

b) Vault lid (access hatch cover) shall be a Halliday Series R1R Model R1R48, or approved equal.

c) Opening of the lid shall be over the larger area of the vault as shown on the detail.

d) The frame edge for the vault lid shall be coated with bituminous coating where in contact with the concrete vault for proper sealing.

e) Four (4) stainless steel lag-bolts with a minimum bolt diameter of 3/8-inch shall be used to mount the frame to the inside wall of the vault. An appropriate concrete anchoring system such as expanding lead lag-shields shall be used. The bolts shall be installed in an equally spaced, four quadrant pattern as shown on the plans or directed by the Owner's Representative.

f) The underside of the lid shall be insulated in cold climates, as shown on the design plans or directed by the Owner or Owner's Representative. The insulation can be field installed or can be factory installed by the manufacturer. Field installed insulation shall be completed using 2-inch polystyrene insulation board with appropriate compatible adhesive or an approved securing mechanism, as directed by the Owner's Representative.

4. ARV Inlet (Riser) and Outlet (Discharge) Piping:

a) Material of the inlet and outlet pipe shall be rigid and non-corrodible. Joining of dissimilar metals should be avoided. If approved by the Owner and show in the plans, dielectric unions may be installed, if dissimilar metals are used. The material of the inlet and outlet pipe shall be as specified on the design plans and detail drawings.

b) The pipe material from the tee/saddle or compression fitting elbow at the bottom of the vault, to the Schedule 80 PVC union shall be brass. The pipe material from the Schedule 80 PVC union to the outlet end of the gooseneck shall be galvanized steel. For the Horizontal Offset Option, the pipe material from the water main to the bottom compression fitting elbow in the vault shall be PE 4710. Appropriate reducers shall be used for the outlet or inlet of the ARV piping, as shown on the design plans and detail drawings.

c) No pipe, valve or fitting on the inlet or outlet line shall be smaller than the ARV inlet or outlet.

d) The stabilizing bracket for the riser piping shall be a Unistrut P1381 Angular Fitting, Unistrut P1000 1 5/8" Solid Channel and Unistrut Cush-A-Clamp, or approved equal.

e) Full port true union type ball valve and fittings shall match the material and size of the riser pipe.

f) Sample tap shall be non-threaded cross wheel style, NSF 61 approved. The Contractor shall provide a valve operating stem key for the sample tap to the operating utility.

g) The above grade outlet of the discharge line (air relief line) shall be a screened return bend as shown on the detail drawing. The screen shall be #24 mesh non-corrodible copper, bronze, or brass.

h) When the ARV is located directly above the water main connection, the connection shall be made with either a tee or a tapping saddle. The tee and reducer shall meet the requirements of TP 04.03.C. The saddle and corporation stop shall be meet the requirements of TP-05.

i) When the ARV is offset from the water main connection, the corporation stop, saddle, PE pipe and fittings shall meet the requirements of TP-05.

H. Blow-off Hydrant Assembly: Blow-off shall be non-freezing, self-draining type, with 6-inch or 4-inch MJ inlet, non-turning operating rod and shall open to the left (counter clockwise). The blow-off assembly shall be a Kupferle Foundry model 7600-4", or approved equal.

1. General:

a) All working parts shall be brass and shall operate with a 2-inch gate valve wrench.

b) When open, valve shall be completely unobstructed, and drain hole shall be covered.

c) Inlet shall be 6-inch or 4-inch FIP, as shown on the plans and details.

d) Outlet shall be 4-inch FIP.

e) Concrete shall conform to Section 02 of the Technical Provisions and reinforcing steel shall conform to Section 03 of the Technical Provisions.

2. Portable Discharge Riser: 4-inch aluminum piping and fittings, 4-inch camlock male to female NPT (quick connect), dimensions and configuration shown on the detail drawings. Portable discharge riser to be constructed by the Contractor and provided to the Owner.

3. Fire Hose and Quick Connect Adapter: 4-inch single jacket fire hose, 50 feet, minimum, 125 psi service pressure. Adapter: stainless steel 4-inch male camlock to male NPT (quick connect). Hose to be provided by the Contractor to the Owner.

4. Blow-off Valve Vault and Cover: Vault shall be reinforced concrete pipe, 24-inch inside diameter. Riser grade rings with tar sealer may be used. Frame and cover shall be heavy duty cast iron, concealed pickslots, gasketed, with Penta Head security bolts, centered over the valve box, stamped "WATER" on top of the lid, Neenah 1295B, or approved equal. Contractor shall provide a Penta Head Wrench and Socket to the Owner.

5. Drain Pipe: If depicted on the plans, the drain pipe shall be 4-inch SDR 35 pipe. The pipe material shall transition to 4-inch DI pipe at outlet end and where bury depth is less than 1-foot. The DI pipe shall be a minimum of 10 feet long. Install #8 steel mesh at outlet end anchored with a 4-inch DI flange adapter and 4-inch DI rectangular accessory bolt pack kit.

I. Tapping Sleeves: Tapping sleeves shall be stainless steel with mechanical joint seals and class 125 outlet flange, Mueller H-304SS, or approved equal.

J. Warning Tape and Tracer Wire: Warning Tape and Tracer Wire (including tracer wire access boxes and tracer wire splice kits) shall be in accordance with Section 01 of the Technical Provisions.

K. Markers and Bollards: Markers and Bollards shall be in accordance with Section 01 of the Technical Provisions.

L. Filter Fabric: Class A 6 oz. nonwoven or woven polypropylene or polyester fabric.

M. Fire Hydrants: Conform to AWWA C502.

1. New hydrants shall conform to the requirements of AWWA C502 (AWWA Standard for Dry Barrel Fire Hydrants).

2. Unless otherwise indicated, hydrants shall be equipped with two National Standard 2 ½-inch hose nozzles and one National Standard 4 ½-inch pumper nozzle.

3. The hydrant inlet connection shall be sized for a 6-inch pipe. The hydrant valve shall open against line pressure and shall be no less than 4 ¼ -inches.
4. The bury depth shall be adequate to maintain the minimum cover over the pipe per TP-4.04.C.
5. The hydrant shall be designed so that all renewable parts can be changed without digging up the hydrant.
6. Hydrants shall be equipped with traffic safety flanges designed to break away in the event of horizontal impact.
7. The operating nut and nuts on each hydrant cap shall be 1 ½-inch National Standard pentagon nuts. Direction of opening shall be counterclockwise, as shown by an arrow cast on the hydrant.
8. Exterior shop coating of the hydrant top section shall be chrome yellow.
9. The hydrant shall have weep holes to allow the hydrant to drain, unless directed otherwise by the Owner's Representative.
10. Concrete shall conform to Section 02 of the Technical Provisions and reinforcing steel shall conform to Section 03 of the Technical Provisions.
11. Acceptable models: Mueller Super Centurion 250, Waterous (American Flow Control) WB-67, or approved equal.

TP - 04.04 PIPE CONSTRUCTION REQUIREMENTS:

Trenching, backfilling and compaction operations shall be performed as specified in Section 01 of the Technical Provisions. Pipe and fittings shall be installed in accordance with the manufacturer's printed specifications and instructions, to the standards of AWWA for installing the type of pipe used, and in accordance with this technical provision.

A. General:

1. Install water mains and appurtenances in the locations and of the sizes and materials shown on the plans and Bid Schedule.
2. Pipe, fittings, valves, and hydrants shall be carefully handled to avoid damage.
3. Contractor to provide staking in accordance with Section 01 of these Technical Provisions.
4. Locating existing utilities shall be the responsibility of the Contractor in coordination with a representative from the operating utility.
5. Existing water mains shall be properly abandoned in place and all facilities located at ground surface shall be removed and disposed of at the Contractor's expense.

B. Pipe Protection:

1. No pipe shall be laid when trench or weather conditions are unsuitable for such work.
2. Under no circumstances shall pipe be laid in water. Trenches shall be kept free from water at all times.
3. The interior of all pipe shall be thoroughly cleansed of all foreign matter before being lowered into the trench and shall be kept clean during laying operations by use of plugs or other approved devices.
4. As the work progresses, the interior of the pipe shall be cleared of all dirt and superfluous materials of every description.
5. Promptly remove all debris that enters the pipeline and swab the area with 1% hypochlorite solution.

6. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed with a water tight plug so that no trench water, rodents, earth, or other substances will enter the pipe or fittings.

C. Pipe Installation:

1. All pipe shall be laid to the depth shown on the plans, or at such depths as may be established by the Owner or Owner's Representative in order to connect the new pipe to the existing water mains.

2. Unless otherwise specified, the pipe shall be laid to a depth that will provide for a cover of at least 3 feet from the top of the pipe to finished grade.

3. Each section of pipe shall rest upon undisturbed earth, or compacted bedding materials, with recesses excavated to accommodate joints.

4. When trench bottom is soft and cannot support the pipe, a further depth and/or width shall be excavated and refilled to grade with stabilization and bedding material as specified in Section 01 of these Technical Provisions.

5. Joints with pipes of differing materials shall be made with appropriate adapters approved by the Owner or Owner's Representative, but in no case will threading of the PVC pipe wall be allowed.

6. Where required, PVC pipe shall be cut square using a powered cutoff saw, carpenter's fine tooth handsaw, or hacksaw. Once cut, the pipe shall be machine or hand beveled to give a one-half inch tapered end.

D. Pipe Deflection:

1. Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflecting the joints.

2. The amount of deflection at each pipe joint shall not exceed the manufacturer's printed recommended deflections.

3. When rubber gasketed pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wider on curves for this purpose.

4. Any pipe that has its grade or joint disturbed after laying shall be taken up and relayed.

E. Backfill and Acceptance:

1. The Contractor shall make every effort to backfill all excavation by the end of each workday.

2. Work covered by this section will not be accepted until the backfilling, compaction and testing connected with the work has been completed satisfactorily.

3. Any section of water main that is found to be defective in material, alignment or joints before acceptance shall be corrected to the satisfaction of the Owner's Representative.

4. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe without additional expense to the Owner.

F. Mechanical Joint Restraints: MJ Restraints shall be installed at all bends, caps, tees, crosses, valves, fire hydrants and flush hydrants (blowoff valve assemblies). Pipe joints adjacent to restrained bends and fittings shall be restrained in accordance with the plans and details.

1. General:

a) Mechanical joint restraints shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.

b) Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts.

2. Special Anchoring Retainer Glands:

a) Install in accordance with manufacturer's recommendations.

b) Fully restraint all joints within 20 feet of a fitting with appropriate restraint. Owner or Owner's Representative may specify that an additional restraint be used for pipe sections near critical fittings.

G. Concrete Thrust Blocks:

1. Thrust Blocks:

a) Concrete thrust blocks shall be used on 2 inch PVC pipe, as shown in the plans.

b) Concrete thrust blocks shall not be used on any water pipe greater than 2 inches in diameter unless specified and approved by the Owner or Owner's Representative and shown on the plans or detail drawings.

c) When thrust blocking is approved by the Owner's Representative, concrete blocking shall bear against solid undisturbed earth at the sides and bottom of the trench excavation and shall be shaped so as not to block weep holes or obstruct access to the joints of the pipe or fittings.

d) Concrete shall not come into direct contact with mechanical joint restraints, if necessary, polyethylene wrap shall be used as a barrier.

2. Concrete:

a) Concrete shall conform to Section 02 of the Technical Provisions and reinforcing steel shall conform to Section 03 of the Technical Provisions.

b) The concrete shall have minimum 28 day compression strength of 3,000 psi.

c) The concrete shall not cover nuts and bolts of joints or fittings.

d) Polyethylene wrap shall be placed on fitting bolts to prevent hardening of concrete on connections.

e) Under no circumstances shall concrete thrust blocks be allowed on vertical bends in lieu of mechanical restrained joints.

H. Warning Tape: Warning Tape shall be installed on all water mains in accordance with Section 01 of the Technical Provisions.

I. Tracer Wire: Tracer Wire (including tracer wire access boxes and tracer wire splice kits) shall be installed on all water mains in accordance with Section 01 of the Technical Provisions.

TP - 04.05 WATER AND SEWER LINE SEPARATION REQUIREMENTS:

Water lines located near sewers present conditions for serious potential cross contaminations. Protection from cross contamination can be provided by separation of the facilities and use of special piping materials. Water and sewer line separation requirements shall strictly adhere to the requirements set forth in Section 01 of these Technical Provisions.

TP - 04.06 INTERCONNECTIONS TO EXISTING MAINS:

A. Interconnections:

1. An interconnection is the connection of a new pipeline to an existing pipeline.

2. An interconnection includes excavation, backfill, compaction, tapping sleeve, adapters, mechanical joint restraints, random lengths of pipe and any other supplies and materials required.

3. Interconnections do not include connections within the new work or service connections. Only those connections of new water mains to existing water mains which require that the existing main be cut or tapped are considered interconnections.

4. Connections to existing valves, fittings, or pipe ends which have been plugged or capped are not considered interconnections. Removal of the plugs, caps, and thrust blocks is considered incidental to normal installation of the new pipe.

5. Shutoff of mains will not be permitted overnight, over weekends or on tribal or federal holidays.

6. Only start work when all the materials, equipment and labor are on site. Once work on the connection has commenced, it shall proceed continuously without interruption, and as rapidly as possible until completed.

7. Any joints not pressure tested for leakage shall be visually inspected under system pressure prior to backfilling. Visual inspection of joints shall be completed under system pressure in the presence of the Owner or Owner's Representative. Repair and retest any joint with leakage until no leakage is visible, at no cost to the Owner.

B. Tapping Permit and Schedule:

1. A tapping permit (if required) shall be obtained by the Contractor from the operating utility and all work shall be performed in conformance with approved tapping permit.

2. If a tapping permit cannot be obtained, the time and method of connection to existing water mains shall be approved by both the operating utility and by the Owner or Owner's Representative (when these two entities are not the same) prior to such connections.

3. The Contractor shall notify the Owner or Owner's Representative and operating utility at least two (2) working days in advance of any water service disruption due to shutting off any portion of the existing water main. Each connection with an existing water line shall be made at a time and under conditions which will least interfere with water service to customers affected thereby as authorized by the operating utility and as evidenced by an approved tapping permit. The Contractor shall coordinate with the Owner and operating utility to notify the residents affected by water shutoff of the time and day of shutoff a minimum of two (2) working days in advance.

C. Tapping into Existing Main:

1. Connections to existing mains shall be made as shown on the drawings.

2. If the connection is a dry connection, the tee used shall meet the requirements of TP-04.03C.

3. If the connection is a wet connection, a stainless steel tapping sleeve shall be used. Stainless steel tapping sleeves shall be equipped with a ¾ inch diameter test plug and internal gasket as specified in TP-04.03.I.

4. Tapping valves shall have ends and seat rings of sufficient size to permit the use of full size cutters of either the Mueller, Ford or Smith type tapping machines.

5. Tapping sleeve valves shall be flanged on one end to fit the tapping sleeve and a flange hub-end or mechanical joint on the other.

6. All connections shall be made in a neat and professional manner. Such connections shall be made to the satisfaction of the operating utility and to the Owner or Owner's Representative.

7. Proper tools and fittings to suit actual conditions encountered in each case shall be utilized. The cutting of pipe for inserting fittings or closure pieces shall be done in strict accordance with

recommendations of the pipe manufacturer and without damage to the pipe or coating, and so as to leave a smooth end at right angles to the axis of the pipe.

8. The interconnection shall be marked and shown in the record drawings.

D. Contamination and Disinfection:

1. Great care shall be taken to prevent pipeline contamination when cutting into and making connections with existing pipelines used for the conveyance or distribution of water for domestic or public use.
2. The Contractor shall cooperate with the operating utility in locating services, and shall conduct his/her operations in such a manner that no trench water, mud, or other contaminating substances are allowed to enter the connected line or lines at any time during the progress of the work.
3. Disinfection procedures for connecting to existing mains shall adhere to AWWA C651 Section 4.7, (Disinfection Procedures When Cutting Into or Repairing Existing Mains).
4. The interior of all pipe, fittings, and valves, installed in such connections, shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed, as directed by the AWWA standard referenced above.
5. All fittings and appurtenances removed in the connection process shall remain the property of the operating utility unless specified otherwise.

E. Provisions for Asbestos-Cement Pipe:

1. If Asbestos-Cement (AC) Pipe is being replaced, the AC pipe shall be abandoned in place.
2. The project may include taps/cuts into the existing AC pipe. Other unexpected or unavoidable breaks into the existing AC pipe are possible.
3. The Contractor shall comply with all applicable Federal, State, Local, EPA, OSHA, and Arizona, Nevada, California and Utah Departments of Transportation regulations pertaining to exposure to and handling, containment, transport, and disposal of asbestos material.
4. If the bidding Contractor is not licensed to perform these services in the state the project is being constructed, the Contractor shall retain the services of a licensed Asbestos Abatement sub-contractor to perform said services.
5. Further, the Contractor/Sub-Contractor must utilize the services of a commercial hauler that is registered with the respective state's environmental regulatory agency to transport asbestos. The Contractor/Sub-Contractor must dispose of any asbestos waste material generated as a result of the construction project at a solid waste facility authorized for asbestos waste disposal.
6. The Contractor, per OSHA requirements, must train field personnel in the identification of asbestos containing material.
7. The Contractor must submit the following items with the bid:
    a) Name and license number of the Asbestos-Abatement Contractor that will be responsible for the work described above.
    b) References (including the owner's name, address and phone number) for at least five comparable projects performed by the Asbestos-Abatement contactor.
    c) A work plan describing work procedures, equipment to be used, transportation procedures and final disposal facility for asbestos material.
    d) A health and safety plan which includes air-monitoring procedures as required by OSHA.

TP - 04.07 SETTING GATE VALVES AND BOXES:

A. General:

1. Install valves at locations indicated on the plans
2. Valve installation shall be as per these specifications and as shown on the detail drawings.
3. All valves, including gate valves, air release valves, and blow-off assemblies, shall be set, jointed and restrained to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished.
4. Before installing the valve assembly, care shall be taken to see that all foreign material and objects are removed from the interior of the valve.

B. Setting Valves and Valve Boxes:

1. Valves and valve boxes shall be set plumb and valve boxes shall be placed over the valve or valve operator in such a manner that the valve box does not transmit shock or stress to the valve.
2. Support gate valves on a 4-inch concrete block set on compacted base during assembly and fully restrain the valve to the water main piping as shown on the detail drawings.
3. Center the valve box over the valve nut.
4. Backfill shall be placed and compacted around the valve box. The valve box shall be maintained plumb and centered over the valve nut during backfilling and compaction.
5. The valve shall be opened and closed to verify that all moving parts are in working order.
6. The cast iron valve box cover shall be set flush with elevated concrete collar or flush with the road surface.
7. Install a debris cap in the valve box meeting the requirements of TP 04.03.F.3 and as shown in the detail drawing.

C. Concrete Collar:

1. After installing the gate valve box, the Contractor shall properly compact the area around the gate valve box prior to installing the concrete collar to ensure that there is no settlement.
2. A 32-inch diameter OR a 24-inch square by 4-inch thick reinforced concrete pad shall be poured around each valve box as shown on the plan and detail drawings or instructed by the Owner or Owner's Representative.
3. A tracer wire access box shall be set in the concrete collar and next to the valve box with the tracer wire routed and connected as shown in the detail drawing.
4. Before the concrete has set, the Contractor shall neatly scribe in the concrete pad the size of the valve, material of pipe and orientation of the pipe with two arrows.

D. Valve Markers:

1. For valves outside of the right of way, the Contractor shall install two offset permanent Metal Marker Posts for all water main valves installed under this contract.
2. The marker posts shall be equidistant (4 feet typical) at a 45 degree angle from the valve to the main.
3. Set marker post with 36-inches of post above grade with label facing roadway and valve between roadway and post.

4. Stencil the size of the valve and the distance to the valve legibly on the aluminum cap. Dimensions and thickness shall meet requirements shown in applicable TP 01 Detail. Metal marker post shall meet the requirements of and be installed in accordance with Section 01 of these Technical Provisions.

5. For valves within the right of way, the Contractor shall install a Utility Line Marker to locate the valve. Utility line markers shall meet the requirements of and be installed in accordance with Section 01 of these Technical Provisions.

TP - 04.08 SETTING COMBINATION AIR VALVES AND VAULTS:

Combination air valves shall be installed in accordance with the manufacturer's printed specifications and instructions. The air valve vault shall be installed in accordance with the applicable sections of TP-01.

A. General:

1. The air release valve and vault shall meet the requirements of TP 04.03.G.

2. Install air release valves and vaults at locations indicated on the plans and as shown in the detail drawings.

3. All air release valves shall be set, jointed and restrained to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished.

4. Before installing the valve assembly, care shall be taken to see that all foreign material and objects are removed from the interior of the valve.

5. Utility marker shall be installed as shown on the detail drawing and in accordance with TP-01.

B. Setting Vault:

1. Vault shall be set plumb and level on solid concrete masonry blocks and gravel base as shown on the detail drawings. The diameter of the gravel base shall be 6-feet minimum. Gravel shall be placed below the vault and in the vault to the depth shown in the detail drawings.

2. If a drain pipe is shown in the plans, the depth of the gravel below the vault shall be 6-inches minimum. If there is not a drain pipe is shown in the plans, the depth of the gravel below the vault shall be 12-inches minimum.

3. Manhole sections, and adjustment rings if required, shall be grouted in place when the manhole is constructed. The grout shall be spread evenly over the entire mating surface. The maximum number of adjustments rings shall be indicated on the plans. The jointing and sealing materials shall be approved by the Owner or Owner's Representative prior to installation.

4. Backfill shall be placed and compacted around the vault. The vault shall be maintained plumb during backfilling and compaction.

5. Penetrations in the vault walls shall be made as shown in the detail drawings. All vault penetrations shall be sealed with approved grout material.

C. Concrete Collar:

1. After installing the concrete vault, the Contractor shall compact the area around the vault prior to installing the concrete collar to ensure that there is no settlement.

2. A 12-inch wide by 6–inch thick (minimum) reinforced circular concrete pad shall be poured around the vault as shown on the plan and detail drawings or as instructed by the Owner or Owner's Representative.

3. The concrete collar shall have a minimum slope of 1/12 away from the vault.

4. The above grade galvanized outlet piping shall penetrate the concrete collar as shown on the detail drawing. The penetration shall be sealed with approved grout.

5. The vault lid shall be securely bolted to the inside wall of the vault per the manufacturer's recommendations. The lid shall be oriented, bolted and sealed in accordance with TP 04.03.G.3. The lid shall be set 4-inches above finished grade with the concrete collar sloping as shown on the detail drawing. A pad lock shall be provided with the lid and keyed as requested by the operating utility.

D. Setting Valve and Piping:

1. The water main line shall be tapped at the location shown on the plans or as instructed by the Owner or Owner's Representative.

2. The inlet line shall be connected to the water main using a water tight connection as shown on the plans. The Contractor shall use the approved connecting fittings including tees, reducers, service saddles, corp stops and piping. Mechanical restraints shall be used as necessary to secure the connection.

3. Where the air release valve and vault are offset horizontally from the water main, the horizontal sections of piping shall have a minimum of 1% slope upwards to allow for the upward movement of air from the water main.

4. The size of the air release valve and fittings, as well as the inlet and outlet piping for the valve shall be as sized by the Owner's Representative and as indicated on the plans.

5. The location and configuration of the air release valve and fittings, as well as the inlet and outlet piping for the valve shall be as indicated on the detail drawings. The riser piping assembly shall be located 12-inches to 18-inches from the vault wall.

6. The internal vault piping shall be supported with a rigid non-corrosive bracket assembly as shown in the detail drawings. This bracket shall be anchored to the internal concrete vault wall with the specified concrete anchor bolts and concrete anchoring system per TP 04.03.G.3.

7. Vinyl tape shall be wrapped around all galvanized steel pipe that is in contact with soil or concrete.

8. The ball valve, sample tap and air release valve shall be tested after installation to verify that all moving parts are in working order.

E. Drain Pipe:

1. The drain pipe shall only be installed if depicted on the plans (where the vault can drain to daylight).

2. The drain pipe shall be constructed to the alignment and length shown on the plans. The drain pipe shall be constructed as shown in the detail drawings.

3. Excavation, backfilling and compaction for the installation of the drain pipe shall meet the requirement of TP 01.

4. The inlet invert of the drain pipe shall be set at the top of the gravel in the vault. The drain pipe inlet edge shall be flush with the interior wall of the vault.

5. The outlet shall be screened per the detail drawings. The outlet screen shall be secured to the end of the drain pipe using the appropriate ductile iron fittings specified in TP 04.03.G.2.h. The outlet screen shall be wire brushed, sprayed with rust neutralizer and then coated with epoxy paint to protect the screen against corrosion.

6. Rip rap shall be installed for erosion protection around the drain pipe outlet.

TP - 04.09 SETTING BLOW-OFF HYDRANT ASSEMBLIES AND VAULTS:

Blow-off hydrants shall be installed in accordance with the manufacturer's printed specifications and instructions. The vault shall be installed in accordance with the applicable sections of TP-01.

A. General:

1. The hydrant shall meet the requirements of TP 04.03.H.
2. Install blow-off hydrants and auxiliary gate valves at the locations indicated on the plans and as shown on the detail drawing.
3. Utility marker shall be installed as shown on the detail drawing and in accordance with TP-01.
4. The hydrant and auxiliary gate valve shall be tested upon completion.
5. The portable discharge riser shall be constructed per TP 04.03.H.2 and shall be provided to the Owner.

B. Auxiliary Gate Valve and Valve Box:

1. The auxiliary gate valve and valve box shall be installed in accordance with TP 04.07. The concrete collar around the auxiliary gate valve and valve box shall be installed in accordance with TP 04.07.C and the drawings.
2. The auxiliary gate valve and valve box shall be located adjacent to the blow-off hydrant per the detail.
3. The pipe length and material type between the blow-off hydrant and the auxiliary gate valve and between the auxiliary gate valve and the water main shall be as designated on the plans and details.
4. Fully restraint joints between the water main tee and the auxiliary gate valve, and between the auxiliary gate valve and the blow-off hydrant.
5. Under no condition shall the diameter of the auxiliary pipe and auxiliary gate valve be less than 4-inches for blow-off hydrants. The pipe and auxiliary valve size shall match that of the blow-off hydrant inlet, as shown on the drawings.
6. Tracer wire and tracer wire access box shall be installed in accordance with the detail drawing and the provisions of TP 01.
7. Rip rap consisting of a minimum 4-inch to 6-inch angular diameter shall be compacted around concrete collar. The rip rap shall be placed around the collar at the required distance and thickness provided in applicable detail. Filter fabric shall be installed between rip rap and native soil as shown in details.

C. Installing Blow-off Hydrant:

1. Blow-off Hydrants shall stand plumb and shall have their nozzles pointed vertically upwards. The hydrant shall be set centered within the concrete vault.
2. Hydrant shall be restrained to the auxiliary pipe according to the manufacturer's recommendation. Contractor shall provide the required bolts, nuts and gaskets for the mechanical joint connection (MJ DI Transition Accessory Pack with Gland) and shall torque the bolts according to manufacturer's recommendation.
3. The hydrants shall be set so that the top of the discharge riser is 12-inches max from the top of the vault cover.
4. The hydrant interior shall be free of all dirt or foreign matter before installation.

D. Hydrant Base:

1. Set hydrant on compacted gravel base and on solid concrete blocks as shown in the detail drawing.

2. A gravel seepage area (drain pit) shall be provided around the weep hole near the hydrant. Gravel shall be installed as per the detail drawing.

3. A suitable concrete thrust block shall be constructed at the base of the hydrant in accordance with the detail drawings. Once the hydrant is set, concrete shall be poured against undisturbed earth in such a manner that the weep hole is kept free from all concrete or mortar. If the weep hole is covered either partially or wholly, the hydrant shall be cleaned in place and the gravel and concrete removed and replaced with new gravel and concrete.

4. Filter fabric shall be placed 4-inches below the top of the gravel drain pit as shown on the detail drawing.

E. Setting Vault:

1. Vault shall be set plumb and level on solid concrete masonry blocks and gravel base as shown on the detail drawings. Gravel from the drain pit shall extend into the vault to the depth shown in the detail.

2. Penetrations in the vault walls (if depicted in the plans) shall be made as shown in the detail drawings. All vault penetrations shall be sealed with approved grout material.

3. Backfill shall be placed and compacted around the vault. The vault shall be maintained plumb during backfilling and compaction.

F. Concrete Collar:

1. After installing the concrete vault, the Contractor shall compact the area around the vault prior to installing the concrete collar to ensure that there is no settlement.

2. A 6-inch wide by 6–inch thick (minimum) reinforced circular concrete pad shall be poured around the blow-off vault as shown on the plan and detail drawings or instructed by the Owner or Owner's Representative.

3. The concrete collar shall have a minimum slope of 1/12 away from the vault.

4. The cast iron frame and cover shall be anchored to the concrete collar and installed per the manufacturer's recommendations. The base of the frame shall be set 2-inches above finished grade.

5. Rip rap consisting of a minimum 4-inch to 6-inch angular diameter shall be compacted around concrete collar. The rip rap shall be placed around the collar at the required distance and thickness provided in applicable detail. Filter fabric shall be installed between rip rap and native soil as shown in details.

G. Drain Pipe:

1. The drain pipe shall only be installed if depicted on the plans (where the vault can drain to daylight).

2. The drain pipe shall be constructed to the alignment and length shown on the plans. The drain pipe shall be constructed as shown in the detail drawings.

3. Excavation, backfilling and compaction for the installation of the drain pipe shall meet the requirement of TP 01.

4. The inlet invert of the drain pipe shall be set at the top of the gravel in the vault. The drain pipe inlet edge shall be flush with the interior wall of the vault.

5. The outlet shall be screened per the detail drawings. The outlet screen shall be secured to the end of the drain pipe using the appropriate ductile iron fittings specified in TP 04.03.H.5. The outlet screen shall be wire brushed, sprayed with rust neutralizer and then coated with epoxy paint to protect the screen against corrosion.

6. Rip rap shall be installed for erosion protection around the drain pipe outlet.

TP - 04.10 SETTING HYDRANTS:

A. General:

1. Install hydrants and auxiliary valves at the locations indicated on the plans.
2. The hydrant shall meet the requirements of TP 04.03.M. It shall be the Contractor's responsibility to order the correct bury depth hydrant or to inform the Owner or Owner's Representative of the necessity for risers when the need becomes apparent.
3. Hydrant installation shall be as shown on the detail drawing. All hydrants shall be tagged or covered until fully operational.

B. Auxiliary Gate Valve and Valve Box:

1. An auxiliary gate valve and valve box shall be located adjacent to the hydrant per the detail drawing.
2. The pipe length and material type between the fire hydrant and the auxiliary gate valve and between the auxiliary gate valve and the main shall be as designated on the details and plans.
3. Fully restraint joints between the tee and the auxiliary gate valve, and between the auxiliary gate valve and the hydrant.
4. Under no condition shall the pipe and valve diameter be less than 6-inch for fire hydrants.

C. Installing Hydrant:

1. Hydrants shall stand plumb and shall have the pumper nozzles oriented perpendicular to the street or in the direction approved by the Owner or Owner's Representative.
2. The hydrants shall be set so that the bury depth indicator on the hydrant barrel is at final grade.
3. Set hydrant with the breakaway traffic flange at an elevation of 2-inches above finished grade. The hydrant interior shall be free of all dirt or foreign matter before installation.
4. The Contractor shall use a hydrant operating wrench to turn the nozzle cap, pin and lug type hose couplings and hydrant operating nut. The Contractor shall replace any components they damage due to using improper tools.

D. Hydrant Base:

1. Set hydrant on compacted base.
2. A gravel seepage area (drain pit) shall be provided around the weep hole near the hydrant. Gravel shall be installed as per the detail drawing. Place gravel from 18-inches below to 6-inches above the weep hole opening.
3. A suitable concrete thrust block shall be constructed at the base of each hydrant in accordance with the plans and details. Once the hydrant is set, concrete shall be poured against undisturbed earth in such a manner that the weep hole is kept free from all concrete or mortar. If the weep hole is covered either partially or wholly, the hydrant shall be removed and cleaned and the gravel and concrete removed and replaced with new gravel and concrete.
4. Filter fabric shall be placed above the gravel drain pit as shown on the detail drawing.

TP - 04.11 POLYETHYLENE WRAPPING:

Where called for in the plans and specifications or directed by the Owner or Owner's Representative, pipe (ductile iron), valves, and fittings shall be encased in a polyethylene protective wrapping referred to hereafter as poly-wrap.

A. Materials: The poly-wrap shall be of virgin polyethylene, not less than 8 mils in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultra violet light will be less than 48 hours. Otherwise the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers.

The poly-wrap shall be secured as specified below with 2 inches wide pressure sensitive plastic tape not less than 10 mils thick. Tape shall be Scotchrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex, or approved equal. The minimum tube sizes for each pipe diameters are indicated in the table below:

Polywrap Flat Tube Widths		
Nominal Pipe Diameter (inches)	**Tube Widths with push-on joints (inches)**	**Tube Widths with mechanical joints (inches)**
4	14	16
6	17	20
8	21	24
10	25	27
12	29	30

B. Installation:

1. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections.
2. With the pipe suspended from the center, the tube shall be slipped over the spigot end and bunched up between the point of support and the spigot end.
3. After the pipe is installed into the bell of the adjacent pipe, the pipe shall be lowered to the trench bottom and the supporting sling removed from the center of the pipe.
4. The pipe shall then be raised at the bell end enough to allow the tube to be slipped along the full length of the barrel with enough left at each end to overlap the adjoining pipe about 1 foot.
5. A shallow bell hole must be made at each joint to facilitate installation of the polywrap.
6. Pull the bunched-up polywrap from the preceding length of pipe, slip it over the end of the new length of pipe, and secure in place with one circumferential turn of tape plus enough overlap to assure firm adhesion.
7. Slip the end of the polywrap from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Tape polywrap in place.
8. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe, and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.
9. Repair any rips, punctures or other damage to the tube with the adhesive tape or pieces of tube material secured with tape.
10. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

TP - 04.12 PRESSURE TESTING:

Pressure testing shall be performed in accordance with these specifications. Use the Pressure Test Form at the end of this section. All water main pipe shall be pressure tested for leaks, including 2-inch pipe that is considered a water main. All pipelines shall be tested for water tightness up to the individual building service meter.

A. Concrete Thrust Blocking: Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the pressure tests shall not be made until at least 48 hours after installation of the concrete thrust blocking, unless otherwise approved by the Owner or Owner's Representative.

B. Equipment and Scheduling:

1. Contractor shall provide all necessary equipment, including but not limited to, an appropriate pump, water container, water meter, pressure gauge, valve, and hydrant or corporation stop connection, and shall perform all work required in connection with the tests.
2. Contractor shall coordinate with the Owner and Owner's Representative so they may witness the entire duration of each pressure test.
3. Prior to requesting the Owner or Owner's Representative to witness the pressure test, the Contractor shall have all equipment set up completely ready for operation and shall have previously successfully performed the test to verify that the test section will pass.
4. The Contractor shall notify the Owner or Owner's Representative a minimum of two (2) working days in advance of the date that the Contractor plans to perform the pressure tests.
5. The test equipment shall be provided by the Contractor and is subject to inspection by the Owner or Owner's Representative.

C. Procedure: Arrangements for water used in pipeline testing and payment for the water shall be coordinated with the operating utility.

1. Test Preparation:

a) Pressure gauges used in testing shall be liquid filled and graduated at a maximum in 5 psi increments.

b) Two gauges will be used simultaneously for verification of the gauges' functionality with one gauge placed at the highest point and one at lowest point of the section being tested.

c) Prior to the test, the pipeline will be pressured to 10 psi above the test pressure, and then the pressure will be decreased to the test pressure so that gauge responsiveness can be observed.

d) Each section tested shall be slowly filled with water, with care being taken to expel all air from the mains and service lines, if installed.

e) If necessary, the pipes shall be tapped at high points to vent the air.

f) The test pressure shall be 150 psi (measured at the lowest point of elevation in the test section).

g) No section shall be tested that is greater than 2,500 feet in length or that has greater than 25 psi pressure change due to elevation.

h) In no case shall the test pressure be allowed to exceed the design pressure for pipe, appurtenances or thrust restraints.

i) The test shall be conducted in such a manner that existing lines and service user's plumbing is not damaged. Damage caused by testing shall be corrected at the expense of the Contractor.

j) All connections, blow offs, hydrants, house services up to the meter yoke, and valves shall be tested with the main as far as is practicable.

k) Air testing of water mains shall not be allowed.

l) Verify that all fire hydrant lead valves and main valves within the test section are open.

m) The test shall not begin until the pipe has been filled with water for at least 24 hours to allow for absorption.

2. Performing Test:

   a) The test section shall be slowly filled, at a velocity below 1 ft/s with potable water and all air shall be vented from the line. Install corporation stops at high points, if necessary, to facilitate air removal, and cap off after successful completion of the test.

   b) Pressurize the main to 150 psi as measured at the lowest elevation along the test section.

   c) The test shall have a minimum duration of two hours with the two hour period beginning when the test pressure is attained and the pump ceases operation.

   d) Any time the test pressure drops 5 psi, the pressure shall be restored to full test pressure and the quantity of water used shall be recorded.

   e) The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter with a sweep unit hand registering 1 gallon per revolution.

   f) At the conclusion of the test period, the Contractor shall pump the test section to full test pressure and record the total water used during the test.

3. Method of Water Measurement:

   a) Supply a means of accurate water measurement that is compatible with the pressurizing equipment (e.g. pump and hoses) such as water meter or water container with gradations. The measuring equipment must meet the approved submittal.

   b) The Contractor shall keep a record of all pressure tests.

   c) Minimum information recorded at the time of the test shall include the contract number, contractor name, date, time, stationing or other description of the test section, length and diameter of the test section, total allowable leakage, leakage detected, pass or fail indication and printed name of recorder.

   d) Copies of field pressure tests records shall be submitted to the Owner to show compliance with these requirements before payment is requested.

   e) Add total amount of water required to re-pressurize the line during and at the end of the test and compare with the allowable leakage as calculated in the Pressure Test Form.

   f) Allowable maximum leakage is 0.04 gallons per inch diameter per 24 hours per coupling.

   g) Visible leakage will not be allowed.

   h) All leaks shall be repaired and additional tests conducted until leakages are less than the allowable maximum. All repairs shall be made in a manner approved by the Owner and shall be at the expense of the Contractor.

   i) Disinfection and leak testing may be conducted concurrently.

TP - 04.13 FLUSHING & DISINFECTION OF MAINS:

A. Flushing before Disinfection:

1. Unless the Owner or Owner's Representative approves the Tablet Disinfection Method, the mains shall be flushed prior to disinfection.

2. Flush with potable water to provide 3 volumetric exchanges in the pipeline at a minimum velocity of 3 feet per second.

3. Pig line after flushing if sediment or debris is still visible in the discharge.

B. General:

1. The water mains, fittings and any existing facilities affected by the work shall be disinfected in accordance with AWWA C-651 (AWWA Standard for Disinfecting Water Mains) with water containing a minimum of 25 mg/l of chlorine.

2. This concentration may be obtained by installing temporary gas chlorination equipment, by introduction of a calcium hypochlorite (HTH) solution at several points, or by inserting soluble chlorine tablets in the pipeline as it is laid.

C. Disinfection Methods:

1. Tablet Method:

   a) This method is allowed only with Owner or Owner's Representative concurrence that storage, handling and installation of pipe were completed such that the pipe interior remained dry, clean and void of sediment and debris.

   b) Introduce tablets or granules to produce a free chlorine concentration of 25 mg/l during pipeline installation.

   c) If tablets are used, only those containing pure calcium hypochlorite will be allowed. Tablets containing any kind of stabilizer are prohibited.

   d) Since some stabilizers contain known or suspected carcinogens the Owner or Owner's Representative may require a certification of purity.

   e) Tablets shall be fastened to the top of the pipe with an NSF 61 approved adhesive such as Dow 732. The number of tablets required is given by Table 2, AWWA C-651.

2. Continuous Feed Method:

   a) Feed a chlorine solution into water entering the main such that the water will have a 25-mg/l free chlorine concentration.

   b) Continue feeding until the entire pipeline to be disinfected is filled with the chlorinated water.

   c) At the end of the 24-hours, there must be at least 10-mg/l free chlorine residual as evidenced by residual tests taken at approximately 1,200 foot intervals along the main.

3. Slug Method:

   a) Feed a chlorine solution into water entering the main such that the water will have a 100-mg/l free chlorine concentration.

   b) Apply the solution continuously and sufficiently to ensure that a column of water with 100 mg/l free chlorine residual is formed in the pipe.

   c) Ensure that all parts of the main and its appurtenances are exposed to the column for at least 3 hours.

   d) Check the residual of the column at 1,200 foot intervals along the main. If it drops below 50 mg/l, inject additional chlorine solution into the entire column such that its residual is raised to 100 mg/l.

   For the Continuous Feed & Slug Test Methods, ensure that the chlorine solution is introduced within 10-feet of the end of the section being disinfected and for all cases is being withdrawn or wasted from the most extreme point relative to the point of water introduction. If branches exist, ensure that the chlorinated solution reaches all portions of the branches.

D. Flushing after Disinfection:

1. After at least 24 hours contact time with the disinfection solution, the line shall be thoroughly flushed.
2. Flush chlorinated water in an environmentally safe manner. In no case shall direct disposal to surface water be permitted.
3. Check the chlorine residual at the time of disposal.
4. If disposal to a community sewer system is available, neutralize the chlorine residual if the free residual is above 10 mg/l.
5. If disposal is to the ground surface or ditch, neutralize chlorine residual if free residual is > 1 mg/l.
6. Flushing shall continue until all visible debris has been removed and the chlorine concentration is the same as in the existing system, or not more than 0.4 mg/l in a new or unchlorinated system.

E. Bacteriological Testing:

1. After disinfection and flushing, but before the water main is placed into service, the Contractor shall collect two bacteriological samples, 24 hours apart, at the service farthest from the water source for each system or independent extension.
2. The samples shall be forwarded to a State or EPA certified laboratory for water testing and analysis. The laboratory fees, shipping fees, etc. shall be paid for by the Contractor.
3. If the results are negative, the system may be put into service.
4. If either of the samples are positive, the system shall be disinfected again and a samples resubmitted for testing. This shall be repeated until negative results are obtained.
5. Contractor shall provide the Owner or Owner's Representative with documentation of results within 24 hours of laboratory results. Successful (negative) bacteriological test results and the required chlorine residual at the connection point to the existing system will be required prior to acceptance and beneficial use.

TP - 04.14 CLEANUP:

Upon completion of the work, the entire site shall be cleared of all debris, and the ground surface shall be finished to smooth and uniform slopes. Cleanup shall be considered an incidental item and no additional payment shall be made for it. All fences, clotheslines, gravel driveways or other obstructions removed during construction shall be left in a condition at least equal to their condition prior to construction.

TP - 04.15 RECORD DRAWINGS:

Record Drawings shall meet the requirements of TP 01 and the Supplementary Conditions of the contract.

TP - 04.16 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT:

All payments will be based on completed work performed in strict accordance with the plans and specifications, and the respective prices and payment shall constitute full compensation for all work completed, including incidentals. No separate payment will be made for thrust blocks, excavation, trenching, compaction and backfilling or other incidental items of work required under this section, and all such costs pertinent to these items shall be included in the applicable unit prices.

A. Water Pipe: Water pipe shall be measured in linear feet along the centerline of the pipe, including fittings, for each of the various sizes of water pipe installed. Payment for water pipe shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, bedding, stabilization

material, compaction, backfilling, pipe installation, fittings, thrust blocks, mechanical joint restraints, water main warning tape, water main tracer wire, tracer wire access box, hydrostatic pressure testing, disinfection, flushing, bacteriological testing, record drawings, final grading, seeding and final cleanup.

B. Gate Valves: Payment for water main gate valves shall be measured each for the various sizes of gate valves installed. Payment for valves shall be at the contract unit price shown in the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, related valves boxes, materials, and incidentals required for a complete installation, including excavation, gate valves, valve box, debris cap, concrete block, mechanical joint restraints, reinforced concrete pad, tracer wire access box, rip rap, marker posts, compaction, backfilling, record drawings, and final cleanup.

C. Fire Hydrants: Payment for hydrants shall be at the contract unit price shown in the Bid Schedule for each type of hydrant shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, tee or tapping sleeve connection to the main, mechanical joint restraints, auxiliary piping, gate valve and box, reinforced concrete pad, tracer wire access box, rip rap, hydrant, thrust block, seepage gravel, concrete blocks, filter fabric, compaction, backfilling, record drawings, and final cleanup.

D. Interconnections: Payment for interconnections shall be at the contract price shown in the Bid Schedule. Payment shall be full compensation for excavation, fittings, tapping sleeves, adapters, thrust blocks, mechanical restrained joints, markers, compaction, backfilling and any other supplies and materials.

E. Water and Sewer Main Crossings: All costs associated with completion of water and sewer main crossings shall be merged with other bid items and will not be considered a separate item for payment.

F. Combination Air Release and Vacuum Valve and Vault: Payment for combination air release and vacuum valves shall be measured each for various sizes of valves installed. Payment for combination air valves shall be at the contract unit price shown in the Bid Schedule. Payment shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, connection to water main, connection fittings, piping, combination air and vacuum valve, ball valve, sample tap, union, pipe support, screened gooseneck, seepage gravel, concrete vault, reinforced concrete collar, frame and cover, drain pipe and screen, drain pipe outlet erosion protection, bollards, compaction, backfilling, record drawings, and final cleanup.

G. Blow-off Hydrant Assembly: Payment for blow-off assembly shall be at the contract unit price shown in the Bid Schedule. Payment shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, tee or tapping sleeve connection to the main, mechanical joint restraints, auxiliary piping, gate valve and box, reinforced concrete collars, tracer wire, tracer wire access box, rip rap, seepage gravel, concrete blocks, thrust block, filter fabric, blow-off valve, RCP vault, CI frame and locking cover, penta head wrench and socket, portable discharge riser, fire hose, utility marker, compaction, backfilling, record drawings, and final cleanup.

H. Testing: No separate payment will be made for pressure testing, disinfection, flushing, and bacteriological testing. All costs associated with completion of all required testing shall be merged with other bid items and will not be considered a separate item for payment.

PRESSURE TEST FORM: METHOD AND RECORD

(Water Pressure Pipes)

Project: _____ Owner: _____

Location: _____ Date: _____

Project #: _____

Contractor: _____

Inspector: _____

Tester: _____

Test Section Area: _____

Test Section Location: From Station: _____ To Station: _____

(I) CALCULATE ALLOWABLE LEAKAGE (for 2 hour test at 150 psi for PVC):

$$L = \frac{N \times D}{300}$$

L = Allowable leakage: _____ gallons

D = Diameter of pipe: _____ inches

N = Number of joints in test section: _____

(II) CONDUCT AIR VOLUME TEST:

1. Pressurize line to 150 psi
2. Remove volume of water equal to amount of allowable leakage
3. Recheck pressure to assure a significant change (10 psi min.) from 150 psi.

(III) CONDUCT PRESSURE TEST:

1. Re-pressurize line to 150 psi
2. Add water as necessary to maintain pressure between 140 and 150 psi for test period (2 hours)
3. Upon completion of test period add water to increase the pressure back to 150 psi
4. Measure total volume of water added in steps 2 & 3. ***If the volume of water added exceeds allowable leakage, the test failed.***

Time	Air Volume Test			Pressure Test			Pass Y/N	Owner Witness Signature
	Initial Pressure (psi)	H_2O removed (gal)	Final Pressure (psi)	Initial Pressure (psi)	Final Pressure (psi)	Total H_2O Added (gal)		
	step 2.1	step 2.2	step 2.3	step 3.3	step 3.3	steps 3.2–3.4		

REMARKS:

_____

_____

_____

"I CERTIFY THE ABOVE REFERENCED SECTION OF WATER MAIN HAS BEEN PRESSURE TESTED AND PASSED IN ACCORDANCE WITH THE PROVISIONS OF THIS SPECIFICATION."

_____

Contractor's Representative Date

_____

Owner's Representative or Inspector Date

SUBMITTAL REVIEW FORM, SECTION 04

WATER TRANSMISSION AND DISTRIBUTION MAIN

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
04.03B1	PVC Pipe		
04.03B2	DI Pipe		
04.03C	DI Fittings (Bends, Tees)		
04.03D	Pipe Restraint		
04.03E	Gate Valve		
04.03F	Gate Valve Box & Lid		
04.03F2 04.03F3	Extension Stem & Debris Cap		
04.03G	Combination Air Release Valve Assembly		
04.03G2, G3, G4	ARV Vault, Cover, Fittings, Valves, Bracket & Piping		
04.03H	Blow-off Assembly		
04.03H2, H3, H4 & H5	Blow-off Vault, Cover, Portable Discharge Riser, Hose, Drain Pipe		
04.03I	Tapping Sleeve		

04.03L	Filter Fabric		
04.03M	Hydrant		
04.11	Poly-wrap		
04.10	Pressure Testing Method & Equip		
04.12	Pressure Test Results		
04.13.C	Disinfection Method		
04.13.E	Water Testing Lab & Bacteriological Results		
04.06	Method of Connection to Existing Water Main		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 05 – WATER SERVICE LINES

TP-05.01 SCOPE:

Furnish all labor, materials, equipment, and incidentals as required, and perform all operations in connection with the complete installation of water service lines, in strict accordance with the applicable plans, details and these Technical Provisions. All permits, permissions, or other authorizations required by the tribal or municipal utility authority for tapping and connection are the responsibility and to the cost of the Contractor.

TP-05.02 GENERAL:

New service line locations are identified on the plans. Water service lines shall be installed as shown on the detail drawing and connected to the existing building water service line stub-out within five (5) feet of the building. Contractor shall verify the location, size, and type of service line stub-out. Service line staking and staking for new water main tap and meter box shall be performed by the Contractor and approved by the Owner or Owner's Representative. Locating existing lines and valves shall be the responsibility of the Contractor in coordination with a representative from the operating utility. Existing water service lines will be properly abandoned in place and all facilities located at ground surface shall be removed and disposed of at the Contractor's expense. Trench excavation and backfilling operations shall be performed as specified in Technical Provision 01 (TP-01).

Contractor shall contact each resident or business to verify the time that water service will be disconnected during service line tie-in. Connection to existing service or utilities, or other work that requires the temporary shutdown of any existing services shall be planned and coordinated with the operating utility.

Pipe joints and fitting installation shall be in accordance with the manufacturer's recommendations. The work will not be accepted until satisfactory backfilling, compaction and cleanup is complete. If the work does not meet the specified requirements of this section, the Contractor shall remove and replace at the Contractor's expense. The Contractor shall leave each premise in a neat and orderly condition, restoring it as near as possible to its original condition and to the approval of the Owner or Owners' Representative.

TP-05.03 WATER SERVICE LINE MATERIALS:

Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.

The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Inspect all materials prior to installation to ensure that they are in new condition. Inspect pipe and fittings for defects. Plastic pipes with scratches, gouges, grooves or discoloration shall be rejected. Remove all materials from site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications.

Each length of pipe used shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, PE or PVC Classification, ASTM Designation and Pipe Class.

A. Polyethylene (PE) Pipe: All polyethylene (PE) pipe and fittings furnished under this specification shall be NSF 61 and AWWA approved for potable water service line, shall conform to ASTM D2239, shall conform to all applicable provisions and requirements of the latest revision of AWWA C901. PE pipe must be 200 psi minimum pressure rated, PE4710 or equal, and shall have a Plastic Pipe Institute (PPI) recommended long term Hydrostatic Design Stress (HDS) of at least 1,000 psi at a temperature of 73ºF (23ºC). Specific pipe sizing and dimension ratio (DR) are provided in the drawings and/or Bid Schedule.

B. PE Pipe Fittings: Brass fittings for the PE pipe shall be designed to prevent collapsing and pullout. Fittings shall use a compression ring, or pack joint, with stainless steel stiffeners, to make a watertight

connection. Fittings shall not contain lead and shall be Mueller Insta-tite, Ford (Ultra-tite, Pack Joint, or Grip Joint), or equal as approved by the Owner or Owner's Representative. All brass fittings shall have the letter "NL" cast into the main body signifying NO LEAD for proper identification.

C. PVC Pipe and Fittings (2-inch): PVC pipe shall be SDR 21 (200 psi). PVC pipe shall meet the requirements of NSF 14. Each joint of pipe shall carry the NSF seal of approval for pipes for potable water. Pipe shall conform to ASTM D-2241 and ASTM D-1784. Rubber coupling rings shall conform to ASTM D-1869.

D. Service Saddles: Water service saddles or clamps, shall be of stainless steel, bronze, or brass construction and of a design that will prevent collapsing of the PVC main line. Service saddles or clamps shall comply with the latest versions of AWWA C605 and C800. Saddles shall be Mueller BR 2 S (for all types of water mains) or BR 2 B (not allowed for PVC mains) Series double strap type, Mueller SS Series stainless steel service saddles (for all types of water mains), Ford FS202 Series double strap type (for all types of water mains), Ford FS303 Series stainless steel service saddles (for all types of water mains), or approved equal, for the size of pipe tapped. Threads shall be IPT.

E. Corporation Stops: Corporation stops shall be brass with IPT inlet and an Insta-tite, Grip Joint, Ultra-tite, or Pack Joint outlet. Corporation stops shall be lead free and be equal to Mueller H-15028 or Ford FB1000-4 per the latest version of AWWA C800.

F. Curb Stops and Boxes: Curb stops shall be brass, Mueller Mark II Oriseal or Ford ball valve curb stop or approved equal. Curb stops shall have IPS to PE Insta-tite (Mueller), Ultra-tite (Ford), Pack Joint (Ford), or Grip Joint (Ford) end connections, a solid tee head roadway, and quarter turn stops. Curb stop valves must comply with the latest version of AWWA C800. Boxes shall be 1-1/4-inch diameter Arch Pattern in cast iron, Mueller, Ford, or approved equal. They shall have a 48-inch minimum box extension length with a 40-inch stationary rod and a one piece locking top.

G. Water Meter and Box Combination:

1. Coppersetter: Ford 70 Series, or equal, lead-free coppersetter with cartridge style dual check valve and angle ball valve stop; 5/8-inch by 3/4-inch or approved equal shall be utilized. Adequate brace bars to support the meter in a horizontal position in a rigid manner shall be provided. Where an Individual PRV is required, a horizontal tandem style lead-free coppersetter with cartridge style dual check valve and angle ball valve stop; 5/8-inch by 3/4-inch or approved equal shall be installed.

2. Individual Pressure Reducing Valve (PRV): If required, or as shown on the plans, PRVs shall be lead-free and NSF-certified. Individual PRVs shall be Zurn-Wilkins Model NR3XL or approved equal. The PRV shall only be installed if indicated on the plans.

3. Water Meter: The water meter shall be a sealed register magnetic drive water meter with nutating disc, positive displacement, magnetic, or ultrasonic lead-free meter. The meter shall be Badgermeter Model 25, Sensus iPerl, Neptune T10 series, Kamstrup Ultrasonic water meter, or equal as indicated on the project plans and as approved by Owner and noted on the Bid Schedule.

4. Meter Box and Cover: Boxes in traffic areas shall be wire reinforced concrete with steel diamond plate or cast iron covers with interlocked sections. Boxes and covers in non-traffic areas shall be wire reinforced concrete. All sections of all boxes shall be nested or otherwise interlocked to prevent lateral movement. Sufficient sections shall be installed to provide a walled enclosure for a minimum depth of 6 inches below the angle valve. Minimum cover opening dimensions shall be 9-inches by 14-inches. Pea gravel or 3/4 inch crushed rock shall be placed inside the meter can below the water meter to a minimum depth of three (3) inches as shown on the drawings. The meter box shall be installed on bricks or masonry block on top of the prepared subsurface.

H. Tracer Wire, Tracer Wire Access Point, and Warning Tape: Shall be installed per the requirements of TP-01.

I. Pipe Hangers: Shall be made of material compatible with piping material. Shall be of sufficient strength to support pipe at full capacity. Shall not affect pipe integrity by abrading, cutting or bending of pipe.

J. Pipe Insulation: Pipe insulation shall be closed cell, pre-slit foam insulation properly sized for pipe and fittings.

TP-05.04 SERVICE SADDLE AND CORPORATION STOP INSTALLATION:

A water service saddle shall be installed at the water main with a corporation stop, without disruption of the main service. Each water service line connection to an existing water main shall be live tapped through the corporation stop with an approved tapping machine, unless otherwise approved by the Owner or Owner's Representative in writing. Dry taps are only permitted during new water main installation, prior to disinfection. Contractor shall take the necessary precautions to prevent damage to the water main during the tapping process.

TP-05.05 WATER SERVICE LINE INSTALLATION:

All water service line components shall be disinfected, by spraying or swabbing with a chlorine solution containing a minimum of 50 mg/L of chlorine. The components shall be disinfected just prior to installation.

A. Water Service Lines

1. Water service lines shall be installed per ASTM D2774 (PE) or AWWA C605-05 (PVC).
2. PE pipe shall be installed with sufficient slack for thermal expansion and contraction.
3. All water service lines shall have a minimum cover of 36 inches, or as directed by the Owner or Owner's Representative.
4. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, or foreign substances will enter the pipes or fittings.
5. Splices are not allowed on the water service line without approval from the Owner or Owner's Representative.
6. Compression couplings shall be used for all connections.
7. For connections beneath the home, install pipe hangers at a maximum spacing of 2-feet apart for all horizontal PE pipe beneath the home. Install pipe insulation at locations shown on the plans.
8. If no connection is made to the building stub out, cap the new water service line within 5-feet of the proposed building with a water tight plug. A piece of No. 3 rebar, 1-foot in length shall be installed to mark the service line terminus. Bury the rebar 6-inches below ground surface. Embed a 2x4 post (or stake) near the service line terminus extending a minimum of 6-inches above the ground.
9. Install Tracer Wire and Warning Tape along the water service lines from the water main to the meter box and to the building, or as shown on the drawings. Tracer wire shall be installed and tested in accordance with TP 01.

B. Curb Stop and Box

1. Curb stops shall be supplied and installed at the locations shown on the plans. The curb stop shall be installed according to the manufacturer's recommendations.
2. Set curb stop on a solid concrete block 2-inches thick by 8-inches wide by 16-inches long. Concrete block shall be set on undisturbed earth. Install stationary rod on the curb stop.
3. Set the top of the curb box flush with finished grade elevation.
4. Support curb box during backfilling operation to prevent movement and maintain a vertical (plumb) position.

C. Water Meter and Box

1. The water meter and box shall be installed as shown on the detail drawing.
2. The meter box shall be installed on top of a gravel base and bricks or masonry blocks as indicated in the detail drawing.
3. The meter box shall be set 1/2 inch above the finished grade of the site or adjacent pavement surface.
4. The meter box shall be supported during backfill to ensure final setting of the meter box is plumb.

TP-05.06 RECORD DRAWINGS:

The requirements of Technical Provision 01 must be met. Failure to properly identify these items will result in the Contractor having to uncover pipe at Contractor's expense to verify their location. The record drawings shall become the property of the Owner after contract completion. Properly reference, record and stake water main tap locations to allow for ready relocation.

TP-05.07 PRESSURE TESTING AND FLUSHING:

Water service lines, joints and meter installation shall be tested by applying mainline pressure to the service line before backfilling and observing leaks in the presence of the Owner's Representative. No visible leakage will be allowed. If a new water main is pressure tested, the water service lines can be tested at the same time and pressure as the water main. Provision shall be made to prevent pressurizing of interior home plumbing during the test. Repair all visible leaks and retest the line until successfully completed, at the Contractor's expense.

After installation, the water service line, meter, and valves shall be thoroughly flushed for a minimum of 15 minutes. Flushing shall be completed prior to connecting to the house or existing service line. If a restricted flow, or leak, is observed, the Contractor shall correct the identified problem prior to backfilling. Contractor shall test the chlorine residual of the flushed water and provide the reading to the Owner's Representative so it can be compared to the minimum required by the operating utility and EPA.

TP-05.08 WATER SERVICE AND SEWER CROSSINGS:

Where water and sewer lines cross, the requirements of TP-01 must be met.

TP-05.09 MEASUREMENT AND PAYMENT:

A. Water Service Lines: Water service lines shall be measured in linear feet along the centerline of the pipe. Payment for the water service lines shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, bedding, stabilization material, pipe installation, backfilling, compaction, seeding, disinfection, hydrostatic testing, flushing, and final cleanup.

B. Service Line Connection: Cost for the water service line connection shall include the water main tap, water service saddle, and corporation stop. Each water service line connection shall be measured such that a water main tap and connection to the corresponding building stub-out or plugged line as required shall be counted as a total of one each. Payment for these connections shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, water main tap, saddle, corporation stop, building stub-out connection or line termination and plugging, applicable tapping fees, backfilling, compaction, and final cleanup.

C. Curb Stop: Curb stop shall be measured as each. Payment for the curb stop shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, curb stop, curb box and stationary rod, fittings, backfilling, compaction, and final cleanup.

D. Water Meter and Box Combination: Water meter and box shall be measured as each. Payment for the water meter and box shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, copper-setter, water meter, water meter box with lid, fittings, gravel, backfilling, compaction, and final cleanup.

E. Water Meter, PRV, and Box Combination: Water meter, pressure reducing valve (PRV) and box shall be measured as each. Payment for the water meter, PRV, and box shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, copper-setter, water meter, PRV, meter box , fittings, backfilling, compaction, and final cleanup.

SUBMITTAL REVIEW FORM
SECTION 05 – WATER SERVICE LINES

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No. Manufacturer, etc.)	Action by Owner
05.03.A	PE Pipe		
05.03.B	PE Pipe Fittings		
05.03.C	PVC Pipe & Fittings		
05.03.D	Service Saddles		
05.03.E	Corporation Stops		
05.03.F	Curb Stops & Boxes		
05.03.G.1	Coppersetter		
05.03.G.2	Pressure Reducing Valve		
05.03.G.3	Water Meter		
05.03.G.4	Meter Box and Cover		
5.03.I & J	Pipe Hangers and Pipe Insulation		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 06 - GRAVITY SANITARY SEWERS

TP - 06.01 SCOPE:

The work covered by this section consists of furnishing all plant, labor, equipment, materials and incidentals, in connection with the construction of gravity sewer mains, manholes and appurtenances, in accordance with the plans and specifications.

TP - 06.02 GENERAL:

All facilities shall be constructed in the locations to the grades and of the sizes shown on the plans. Locating existing utilities shall be the responsibility of the Contractor in coordination with a representative from the operating utility. Excavation, trenching, backfilling, compaction and any needed dewatering shall be completed in accordance with Section 01 of the Technical Provisions, unless specifically altered under other requirements of this specification section.

Any section of sewer that is found defective in material, alignment, grade or joint shall be corrected so as to meet these plans and specifications. If the work does not meet the specified requirements of this section, the Contractor shall remove and replace at the Contractor's expense.

TP - 06.03 MATERIALS:

Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.

The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Inspect all materials prior to installation to ensure that they are in new condition. Inspect pipe and fittings for defects. Plastic pipe with scratches, gouges, or grooves shall be rejected. Plastic pipes with discoloration shall be rejected. Remove all materials from site that are discolored, defective, damaged, used, unsound, or that otherwise do not meet the specifications.

A. Pipe, Joints and Fittings:

1. PVC Gravity Sewer Pipe: Sewer pipe shall be PVC and shall conform to all requirements of product standard ASTM D3034 for pipe diameters up to 15 inches and ASTM F679 for 18-inch to 48-inch diameter sewer mains.

    a) Sewer pipe shall meet the pipe compound requirements of ASTM D1784 and shall be made with PVC 1120 resin, Type I, Grade I. Pipe stiffness shall meet ASTM D2412.

    b) Pipe shall be nominal size, SDR-35.

    c) Joints shall be furnished with one end belled. The joint shall be integral bell and spigot with a Rieber rubber gasket. The integral bell shall meet ASTM D3212. The gaskets shall be as recommended by the pipe manufacturer and shall meet ASTM F477. Lubricants used for the joint installation shall meet the requirements of the pipe manufacturer.

    d) Each length of pipe shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, PVC Cell Classification, Type PSM PVC Sewer Pipe, ASTM Designation and Pipe Class.

2. Ductile Iron Pipe: All ductile iron pipe shall be in accordance with AWWA C151 and shall be in 18 to 20 foot lengths with single rubber gasket (push-on) joints in accordance with AWWA C111.

a) All 8-inch pipe will be minimum Class 50 in accordance with AWWA C150.

b) Each length of pipe shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, ASTM Designation and Pipe Class.

3. Fittings: Fittings for gravity sewer pipe, including but not limited to wyes, tees, saddles, bends, crosses, sleeves, plugs, caps, reducers, and glands, shall be the same material as the sewer main being connected. Saddles fastened to pipe with external bands are not acceptable on new pipe. All of the fittings listed above, other than wyes, shall require approval from the Owner and Owner's Representative and shall only be installed when shown on the plans.

a) PVC fittings shall conform to PVC gravity sewer pipe requirements provided in this section.

b) Ductile iron fittings shall conform to the requirements of AWWA C110 with the joints meeting the requirements of AWWA C111.

B. Manholes:

1. General: All concrete used for cast in place shall conform to Section 02 of these Technical Provisions. Concrete and reinforcement shall conform to ASTM C478. Reinforcing steel shall also conform to Section 03 of these Technical Provisions.

2. Lines and Grades: All manhole locations shall be as shown on the plans unless field changes are necessary and approved by the Owner or Owner's Representative.

a) Sewer line cut stakes shall be provided by the Contractor, at each manhole and at the midpoint between each manhole at a minimum.

b) A minimum of 2 offset stakes shall be provided for each cut stake. Further information on staking is found in Section 01 of these Technical Provisions.

3. Manhole Frames and Covers: Frames and covers shall be grey cast iron casting and shall conform to plans and details in all essentials of design.

a) The cover shall have a lifting pocket and shall not be vented.

b) Castings shall conform to ASTM A-48, Class 30 and shall maintain AASHTO HS-20 traffic loading requirements.

c) The bearing surfaces of the frames and covers shall be machined and the cover shall seat firmly onto the frame without rocking.

d) Combined weight of frame and cover shall be 280 lbs minimum.

e) Covers shall be the types and shall be imprinted as shown on the plans or standard details.

f) The manhole and covers shall be set as shown on the plans or as directed by the Owner.

g) Frames and covers shall be Neenah R-1595, Jensen Model A-1024 or approved equal. The manhole lid shall be cast with the word "SANITARY SEWER".

h) Manhole inserts shall be installed in each manhole. The inserts shall be manufactured from ultra-high density polyethylene meeting the requirements of ASTM D-1248, Class A, Category 5 with a minimum uniform thickness of 1/8". The lift strap shall be made of a woven polypropylene web. Manhole inserts shall manufactured by Parson Environmental, Sealing Systems, Inc., or approved equal.

4. Steps:

a) Steps shall be cast iron or 1/2-inch Grade 60, steel reinforced copolymer polypropylene plastic not less than 12 inches in width.

b) If the polypropylene steps are utilized, care shall be taken to install them exactly according to the manufacturer's recommendations. All steps must be installed by manufacturer.

c) Steps shall be centered over the manhole outlet (unless otherwise shown on the plans or requested by the Owner), spaced 16 inches apart and aligned to form a continuous ladder.

5. Adjustment/Grade Rings:

a) General:

i. Adjustment/grade rings shall be made of concrete, HDPE or approved equal and shall be H25 traffic rated.

ii. Ring sealant shall provide a watertight seal.

b) Concrete:

i. Concrete grade rings shall be reinforced.

ii. Concrete grade rings shall be provided by the same manufacturer of the manholes for which they are being installed.

c) HDPE:

i. Adjustment rings shall be available in a variety of thicknesses.

ii. Adjustment rings shall be corrosion proof, and shall be resistant to UV, heat and hydrogen sulfide gas.

iii. Adjustment rings shall be available in slope rings to allow for easy adjustments to any grade.

iv. Adjustment rings shall be composed of high density polyethylene and shall be Ladtech Systems or approved equal

6. Manhole Bases:

a) Precast bases with precast channels shall be pre-approved by the Owner or Owner's Representative. The Contractor shall submit detail drawings showing the size, placement, and spacing of reinforcing bars for both pre-cast and cast-in-place manhole bases.

b) Bottom manhole sections shall have integral precast base or floor slabs.

c) Bases shall be 8 inches thick and bedded on 8 inches of compacted gravel meeting the requirements of TP 01.

d) Cast-in-place bases may be accepted on a site specific basis and as approved by the Owner or Owner's Representative.

e) Cast-in-place base slabs shall be constructed of reinforced Class A concrete formed, poured and vibrated as a monolithic pour onto an 8" gravel base.

f) Concrete for cast-in-place manhole bases shall be batched from a concrete batch plant and shall meet or exceed the compressive strength of the barrel and cone sections. On-site, field mixed concrete shall not be allowed. Cast-in-place manhole base bench and channel shall receive a smooth trowel finish.

7. Standard Manholes:

a) Standard manholes are those which have a depth, measured from the invert of the outlet pipe to the top of the cover, greater than 6 feet.

b) Standard manholes shall be constructed with a 4-foot inside diameter and 5-inch thick precast concrete sections and shall be constructed as shown on the detail drawing.

c) Cone sections shall be eccentric, 5-inch thick, precast concrete.

d) The base slab for standard manholes shall be 8- inches thick for manholes up to 13 feet deep and 12-inches thick for manholes between 13 feet and 20 feet deep. For standard manholes deeper than 20 feet deep, structural calculations are required to determine the base thickness.

8. Shallow Manholes:

a) Shallow manholes shall have a depth of 6 feet or less.

b) They shall be constructed with a 4-foot inside diameter and a 5-inch thick precast concrete section.

c) Shallow manholes shall have an 8-inch thick reinforced concrete flat top cover and base slab. They shall be constructed as shown on the detail drawings.

9. Drop Manholes:

a) Manholes shall have drop piping provided for sewer entrances at an elevation of 24 inches or more above the manhole invert.

b) Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

c) Drop manholes should be constructed with an outside drop connection in accordance with the details.

d) As shown in the detail, the entire outside drop connection piping on the exterior of the manhole shall be encased in ¾" crushed rock.

10. Diversion Manholes:

a) Diversion manholes shall have a depth of 6 feet or less and shall be constructed with a 4-foot inside diameter and a 5-inch thick precast concrete section.

b) They shall have 8-inch thick reinforced concrete cover and base slabs.

c) Diversion manholes shall be constructed as shown on the detail drawings.

d) Each diversion manhole shall be provided with a fiberglass gate frame and gate. The fiberglass gate frame shall have a thickness of 3/16-inch. The gate frame shall have a channel that is ¼-inch. The fiberglass gate shall be ¼-inch thick. The gate frame and gate shall be constructed as shown on the detail drawings.

11. Manhole Coating: Coating shall only be applied at the manhole locations shown on the plans.

a) The inner surface of the new manhole sections and rings shall be lined with solvent free, 100% solids epoxy product as manufactured by Raven Lining Systems, Oklahoma, or approved equal.

b) The coating shall include a prime coat – 8 mils of AquataPoxy A-10 and a top coat of 100-125 mils of Raven 405. Total Dry Film thickness of epoxy coating system shall be a minimum of 105 mils.

c) Surface preparation, application methods and safety measures shall follow the manufacturer's recommendation.

12. Joints: Joints between precast manhole sections elements shall be sealed with a flexible gasket equal to Ram-Nek, ConSeal, or equal resin sealant, and grouted.

13. Waterstops:

a) All pipe penetrations through the manhole shall be equipped with waterstop devices conforming to ASTM C923.

b) Waterstop devices shall be equal to Kor-N-Seal 106-406 Series manufactured by Trelleborg, PSX: Positive Seal manufactured by Press-Seal Gasket Corporation, Z-Lok Connector manufactured by A-Lok Products, or Newby Waterstops by Newby Rubber Inc.

c) All penetrations shall then be grouted to provide a watertight penetration.

C. Sewer Main Cleanouts:

1. The cleanouts shall be constructed of the same pipe material and size as the sewer main, with a reinforced concrete collar, and cast iron frame and cover.

2. The frame and cover to be furnished on cleanouts shall be a Neenah R 1791-A, Star Pipe Product VB-0029 or approved equal. Lids shall be furnished standard with concealed, watertight pickhole, sealed with gasket, and fastened with stainless steel bolts.

3. All concrete for sewer main cleanouts shall have a 28 day compressive strength of 3,000 psi and be in accordance with Section 02 of these Technical Provisions.

D. Warning Tape: Warning tape shall be installed in accordance with Section 01 of the Technical Provisions.

E. Markers and Bollards: Marker and bollards shall be installed in accordance with Section 01 of these Technical Provisions.

TP - 06.04 TRENCH EXCAVATION AND BACKFILL:

Trenching and backfilling operations shall be performed as specified in Section 01 of these Technical Provisions.

TP - 06.05 WATER AND SEWER LINE SEPARATION REQUIREMENTS:

Water and sewer pipeline separation shall be maintained in accordance with Section 01 of these Technical Provisions.

TP - 06.06 INSTALLATION OF GRAVITY SEWER LINES:

Pipe joints and fitting installation shall be in accordance with the manufacturer's recommendation.

A. Trenches:

1. Excavation, trenching and backfill shall meet the requirements of Section 01 of these Technical Provisions.

2. The bottom of the trench shall be shaped to give uniform support to the pipe.

3. Trenches shall be kept free from water and the pipe shall not be laid when conditions of the trench or weather are unsuitable for such work.

4. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substances will enter the pipe.

5. If the maximum width of the trench at the top of the pipe specified in Section 01 of these Technical Provisions is exceeded for any reason other than at the direction of the Owner or Owner's Representative, the Contractor shall install such concrete cradling, encasement, gravel base or other bedding as may be required to satisfactorily support the added load of the backfill.

B. Pipe Laying:

1. Installation of pipe and fittings, including joint lubrication and assembly shall be in accordance with the manufacturer's recommendations.

2. Pipe laying shall proceed upgrade (from lowest elevation to highest elevation), with the spigot end pointing in the direction of the flow (bell pointing upstream).

3. Each pipe shall be laid true to line and grade as shown on the plans, and in such a manner as to form a close concentric joint with the adjoining pipe. Ensure that vertical alignment does not deviate from 0.05% or 0.1 feet, whichever is less, from the design grade show in the plans.

4. The grade between manholes and cleanouts shall be uniform.

5. As the work progresses, the interior of the sewer pipe shall be cleared of all dirt and extraneous materials of every description.

6. Warning tape shall be installed along the sewer main between the manholes and cleanouts.

7. All sewer main line stub-outs shall be plugged. A PVC cap shall be solvent welded to the main line stub out. A piece of No. 3 rebar, 1-foot in length shall be installed to mark the main line stub out. Bury the rebar 6 inches below ground surface. A PE marker painted green shall also be installed at this same location.

TP - 06.07 INSTALLATION OF MANHOLES:

A. General:

1. Manholes shall be installed at the locations and elevations shown on the site plans.

2. Bases, walls and cones shall conform to the plans and details.

3. Manholes shall be installed so that the walls are vertically plumb.

B. Manhole Channel:

1. The manhole shall be positioned such that the pipes intersect in the center of the manhole circle. The invert channels will be formed directly in the concrete.

2. Manhole invert channels shall be smooth and semi-circular in shape, conforming to the inside of the adjacent sewer pipe section.

3. The invert shall be finished smoothly with a semi-circular cross section. Flat-bottomed inverts shall not be acceptable. Inverts with humps, low spots, or roughness of finish which will catch solid materials will not be acceptable. Inverts shall not be brush finished.

4. A minimum invert elevation drop of one-tenth of a foot (0.1 feet) from the entrance to the outlet shall be provided in all manholes where there is a change in direction or change in grade.

5. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. S-curves will not be acceptable.

6. Changes in sizes and grade of the channels shall be made gradually and evenly.

7. For those manholes where the sewer pipe does not change grade or direction the invert may be constructed by laying a full section of sewer pipe through the manhole. The top half of the pipe shall be removed after the concrete sets. Concrete bench shall be to the spring-line of the pipe.

C. Manhole Benches:

1. The floor of the manhole outside the channels (benches) shall be smooth and shall be sloped no less than ½ inch per foot (4 percent) and a max of 2 inches per foot (16 percent).

2. No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench.

D. Manhole Sections:

1. Joints between precast manhole sections shall be sealed with "Ram Nek" bituminous rope type sealer or equal.
2. Install joint sealants around entire circumference of each manhole joint.
3. Place sealant on the lower horizontal surface of the joint. Ensure that a watertight seal is provided at the joint.
4. The sections shall then be grouted to a smooth finish on the interior and exterior of the manhole. Grout for jointing shall be as specified in Section 02 of these Technical Provisions. Grouting joint of the manhole exterior shall be completed after joint sealant seals the joint completely. Manhole testing for water tightness may be completed prior to grouting the manhole exterior.
5. Contractor shall obtain approval from the Owner prior to using tape as a substitute for grout. Tape shall be Viscotaq or equal.
6. Manhole sections and adjustment rings, if required, shall be grouted in place when the manhole is constructed. The grout shall be spread evenly over the entire mating surface.
7. The jointing and sealing materials shall be approved by the Owner or Owner's Representative prior to installation.
8. For shallow manholes, install top slab section with the opening over the outlet of the manhole.

E. Adjustment/Grade Rings:

1. The maximum number of adjustment/grade rings shall be (3) or as indicated on the plans. Manholes in traffic areas shall have at least one adjustment ring.
2. All adjustment ring joints shall be sealed and watertight. For HDPE adjustment rings, install joint sealants in all joints between adjustment rings. For concrete adjustment rings, grout in place on the inside and outside when the manhole is constructed.
3. The total thickness of adjustment rings shall not exceed 18 inches. Maximum spacing between the top of the manhole cover and the first step shall be 28 inches. This spacing can be reduced by having the manhole manufacturer add another step closer to the top of the cone, if shown in the drawings. Steps shall not be added in the field by the Contractor.
4. No cracked or damaged adjustment rings shall be installed.

F. Frame, Cover and Collar:

1. The manhole frames and covers shall be set to the elevations shown on the plans.
2. In roadways, the top of the frame and cover shall be even with the road wearing surface.
3. A 42-inch diameter reinforced concrete collar shall be installed on the frame, cover, and the adjustment rings.
4. The tops of all manholes shall have a concrete collar of the dimensions shown in the details. The collar shall cover the thickness of the ring and the top joint with the first grade ring.
5. In unimproved areas, the collar shall extend from the top of the cover to the bottom of the lowest adjustment ring. The surface of the concrete collar shall have a smooth finish.

G. Drop Manholes:

1. Type and location of drop manholes are shown on the plans and shall be constructed in accordance with the details.

2. Install an outside manhole drop where the invert of the inlet pipe is more than 24-inches higher than the invert of the outlet pipe.

3. Use the same material that is used for the sewer main pipe to construct the drop piping.

4. The exterior piping of the drop manhole shall be supported/encased by ¾" crushed rock at 100% relative compaction. The encasement material shall be carefully placed to avoid damage to the piping or fittings and to the integrity of the joints.

H. Pipe to Manhole Connections:

1. Install sanitary sewer main pipe to manhole using approved gasket per manufacturer's recommendations.

2. All connections between sewer pipe and manhole walls shall be made using approved water stops and be sealed with non-shrinking grout in such a manner to make the manholes water tight.

3. Manholes shall not be acceptable if any evidence of infiltration into them is found. The Contractor shall take whatever actions are necessary, at his expense, to ensure that the manholes are completely watertight.

TP - 06.08 INSTALLATION OF SEWER MAIN CLEANOUTS:

Where indicated on the plans, a cleanout shall be furnished and installed by the Contractor in lieu of a manhole. The cleanout shall be constructed as shown on the detail drawings. Excavation, backfill and compaction shall meet the requirements of TP 01. When identified in the plans, the sewer main cleanout may be installed with a single long sweep 90 degree fitting in lieu of the two 45 degree fittings.

TP - 06.09 CONNECTION TO EXISTING MANHOLES:

Connection of newly constructed sewer mains to existing manholes shall be of either the drop or at-grade type as indicated in the plans and listed on the Bid Schedule. If connecting to an existing manhole, Contractor shall core drill the new penetration into the wall of the existing manhole and shall reshape the existing channel and bench wall to accommodate the new flow line. Reconstruction of manhole bases and inverts, all necessary piping, and associated work required to complete the connection shall comply with the provisions of this Technical Provision.

TP - 06.10 MANHOLE ABANDONMENT:

Manholes designated to be abandoned shall be removed a minimum of three (3) feet below the finished surface. Frame and cover castings shall be carefully removed and delivered to the Owner. Prior to backfilling, pipe connected to the manhole shall be plugged or sealed as approved by Owner or Owner's Representative. Removed portions of the manhole may be crushed and included as backfill to fill the remaining manhole. No crushed manhole debris shall be allowed in the final three (3) feet below finished grade. Backfilling and compaction shall be in accordance with TP-01 of the Technical Specifications and final backfill shall be brought up to surrounding grade.

TP - 06.11 SEWER MAIN AND MANHOLE TESTING:

A. Sewer Main Testing General:

1. General:

a) Sewer main testing shall be done after the trenches are backfilled and final grading is finished.

b) Contractor shall furnish all materials, labor and equipment to perform the required tests. All tests shall be performed in the presence of the Owner's Representative.

c) All sections of sewer not passing the tests shall be replaced in accordance with Owner's Representative approved methods. Repairs and retesting shall be performed at the Contractor's expense. Retests shall be performed until tests pass the requirements.

2. Sewer Main Flushing:

a) The Contractor shall flush all sewer lines before testing to remove sand, silt and other foreign material which might have entered the pipe during construction.

b) Water used for flushing shall be domestic quality or as approved by the Owner or Owner's Representative and shall be coordinated with the operating utility.

c) All equipment and water for the flushing shall be furnished by the Contractor.

d) The Contractor shall dispose of all water and foreign matter after flushing in an approved manner.

B. Sewer Main Alignment: Lamping shall be performed by the Contractor in the presence of the Owner or Owner's Representative using mirrors to observe the pipe reflection from the surface. The ground surface from where the lamping takes place shall be properly shored or benched for personnel safety. Any deviation from true line or grade may be cause for rejection of the line. Deviations exceeding 0.1 feet from the true line or grade which prevents water from draining by gravity from the sewer system, including manholes, shall be corrected such that the facilities meet these specifications and plans. For horizontal alignment, a deviation allowance of 0.1 feet inside the pipe may be accepted by the Owner or Owner's Representative.

C. Sewer Main Water Tightness: Tests for water tightness in the gravity sewer mains shall be made by the Contractor in a manner approved by and in the presence of the Owner or Owner's Representative. Testing for water tightness in gravity sewer mains may be accomplished by either of the following two methods:

1. Low Pressure Air Test: Testing shall conducted in accordance with ASTM F-1417. Testing gauge for the air test shall have a minimum division of 0.1 psi. No one shall enter a manhole when a line into it is pressurized.

a) Test Requirements & Setup:

i. Plug all pipe outlets with test plugs capable of holding under the test pressures. Install plugs and brace as necessary to ensure that the plugs will not blow out when the main is under pressure.

ii. Test each newly installed section of gravity sewer line between manholes.

iii. Slowly introduce air pressure to approximately 4.0 psig. Never exceed a pressure of 9.0 psig. Do not enter manhole once pipe is pressurized.

iv. Allow pressure to stabilize for at least five (5) minutes.

v. Adjust pressure to 3.5 psig or the increased test pressure as determined below if groundwater is present. Start the test.

b) Test Procedure

i. Determine the test duration for a sewer section with a single pipe size from the table below:

Low Pressure Air Test – Test Times	
Sewer Main Diameter (inches)	**Test Time (Minutes/100 Feet of Sewer)**
4	0.3
6	0.7
8	1.2
10	1.5

12	1.8
24	3.6

ii. Record the drop in pressure during the test period. If the air pressure has dropped more than 1.0 psig during the test period, the line is presumed to have failed. If the 1.0 psig air pressure drop has not occurred during the test period, the test shall be discontinued, and the line will be accepted.

iii. If the line fails, determine the source of the air leakage, make corrections and retest. The Contractor has the option to test the section in incremental stages until the leaks are isolated. After the leaks are repaired, retest the entire section between manholes.

iv. Individual service lines shall be tested by plugging the service line termination prior to connecting to the home or building, and plugging sewer cleanouts, and then testing concurrently with main section to which it is connected.

2. Exfiltration/Infiltration:

a) All equipment and water for these tests shall be furnished by the Contractor. This test will be made after the line has been completely backfilled.

b) Infiltration testing shall be completed under existing ground water conditions.

c) Exfiltration testing shall be conducted under an internal pipeline test pressure generated by a water level at least 4 feet above the highest elevation of the sewer main crown to be tested.

d) The test shall be run for a minimum of a four hour period.

e) The sewer and manhole connections shall not leak under either external or internal water pressure in excess of 0.158 gallons per hour per 100 feet of pipe per inch of diameter of pipe. A suitable meter or method of measuring the quantity of water used is necessary.

f) Leakage by either infiltration or exfiltration greater than specified above shall be corrected by the Contractor at his expense.

D. Deflection Test: The maximum allowable deflection (reduction in vertical inside diameter) for PVC pipe shall be five percent (5%). However, up to seven and one half percent (7½ %) may be allowed 30 days after final backfilling. Deflection testing is required in all cases between all manholes. All locations with excessive deflection shall be excavated and repaired by re-bedding or replacement of the pipe. Acceptable methods of deflection testing include use of properly sized go-no-go mandrels or deflectometer. Acceptable mandrel dimensions for SDR 35 PVC pipe are included in the following table. To be considered successful, the mandrel shall pass through the entire length of sewer main in one smooth pass without additional mechanical force. Deflection testing is not required for ductile iron sewer mains.

Sewer Main Diameter (inches)	Madrel O.D. (inches)
6	5.31
8	7.09
10	8.84
12	10.51
15	12.86

E. Video Inspection: If required by the Contract and included in the Bid Schedule, the Contractor shall provide the Owner with a post construction video inspection record of the new sewer pipeline. The video shall clearly show all joints, seals, connecting pipes, and manholes. Video inspection shall be paid by the Owner as a pay item separate from pipe installation, flushing, and other testing requirements. The video

shall be provided on any of the following media (DVD, USB Flashdrive, SD Card or MicroSD Card). The video format shall be viewable on Windows Media Player.

F. Manhole Testing:

1. General:

a) Tests for water tightness of manhole shall be made by the Contractor in a manner approved by and in the presence of the Owner or Owner's Representative.

b) Existing manholes to which a new main is connected do not need to be tested.

c) All newly-constructed manholes shall be tested for watertightness. New manholes shall be tested immediately after assembly and prior to backfilling.

d) If the manhole fails the initial test, necessary repairs shall be made and the manhole shall be retested.

e) All lift holes shall be plugged with an approved non-shrink grout.

f) Pipes entering the manhole shall be plugged, taking care to securely brace the plug.

g) Care must be taken not to break any seals during backfill operations. If the Owner suspects seals broken during backfilling, he shall require a second test after backfilling.

h) The Contractor shall be responsible for cost of the retest and repairs if second test fails.

i) One of the following methods shall be used; either vacuum or hydrostatic testing.

2. Vacuum Testing:

a) Vacuum testing should be conducted in accordance with ASTM C-1244 (Vacuum Test for Concrete Manholes), except as modified below.

b) The vacuum test head shall be installed per the manufacturer's recommendations.

c) A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches.

d) The manhole shall pass if the time is greater than 60 seconds for 48-inch diameter, 75 seconds for 60-inch, and 90 seconds for 72-inch diameter manholes.

3. Hydrostatic Testing:

a) Hydrostatic testing shall be conducted in accordance with ASTM C-969 except as modified below.

b) The mains into and out of the manhole shall be plugged with a suitable device such as a tethered pneumatic plug.

c) The manhole shall be filled with water to the ring.

d) After a period of at least one hour to allow for concrete absorption and to allow the water level to stabilize, the manhole shall be refilled and the water level shall be checked.

e) The hydrostatic test shall then begin and shall be administered for a period of 4 hours.

f) If the water level is found to drop more than 1 inch per foot of depth of the manhole over this 1 hour duration, then the leakage shall be considered excessive and the Contractor shall be required to make all necessary repairs and retest the manhole.

g) The exterior of the manhole shall be inspected during this period for visible evidence of leakage.

h) Visible moisture, sweating, or beads of water on the exterior of the manhole shall not be

considered leakage, but any water running across the concrete surface will be considered leakage and shall be repaired to the satisfaction of the Owner's Representative regardless of the volume of water lost during the test.

TP - 06.12 CLEANUP:

Upon completion of the work, the entire site shall be cleared of all debris, and the ground surface shall be finished to smooth and uniform slopes. All fences, clotheslines, gravel driveways or other obstructions removed during construction shall be left in a condition at least equal to their condition prior to construction. Cleanup shall be considered an incidental item and no additional payment shall be made for it, but rather its costs shall be merged with the applicable pay item irregardless of whether cleanup is specifically included in the measurement and payment section. Seeding shall be completed in accordance with Section 01 of these Technical Provisions.

TP - 06.13 RECORD DRAWINGS:

The Contractor shall be responsible for keeping accurate records of all installed items under this section of the specifications, and indicating revisions of the Owner furnished construction drawings in sufficient detail to be accepted by the Owner or Owner's Representative for record drawings. Sufficient detail under this contract means that the Contractor shall take accurate measurements and record them on the drawings to provide the minimum information of at least two swing ties and distances to permanent objects for all manholes and cleanouts; the beginning and end of any stabilization material placed; the beginning, end, and depth of rock encountered; the beginning, end, and depth of any encasement installed; and the location and depth of any other utilities encountered. Also to be noted on the plans is the final elevation of all manhole lids, inverts, and the ground immediately adjacent to the manhole lid and the distance and angles between the manholes. Further information on record drawings is contained in TP-01 and the Supplementary Conditions.

The recording of the as-built information is considered an integral part of the progress of this construction and shall be reviewed with the Owner or Owner's Representative in determining progress under this contract.

TP - 06.14 MEASUREMENT AND PAYMENT:

A. Gravity Sewer Main: Gravity sewer main shall be measured in linear feet along the centerline of the pipe, center to center of the manhole without deduction for fittings or diameter of manholes, for each of the various sizes and types of pipe installed. Payment for sewer pipe shall be at the contract unit price for the various sizes and types of sewer main installed as shown on the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, testing (alignment, water tightness and deflection), and incidentals required for a complete installation, including but not limited to excavation, bedding, stabilization material, laying and jointing pipe, exfiltration/infiltration testing or air testing, supplying water, plugging, measuring, flushing, backfilling, record drawings, and final cleanup.

B. Standard Manholes: Standard manholes shall have a depth greater than 6 feet when measured from the invert of the outlet pipe to the top of the cover, and shall be measured each. Payment shall be at the contract unit price for the various depths of manholes installed as shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, material, testing and incidentals required for a complete installation, including but not limited to excavation, concrete, frame and cover, steps, adjustment of height, invert forming, connection to sewer lines, backfilling, record drawings, and final cleanup.

C. Shallow Manholes: Shallow manholes shall have a depth of 6 feet or less when measured from the invert of the outlet pipe to the top of the cover, and shall be measured each. Payment shall be at the contract unit price shown on the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, testing and incidentals required for a complete installation, including but not limited to excavation, concrete, frame and cover, steps, adjustment of height, invert forming, connection to sewer lines, backfilling, record drawings, and final cleanup.

D. Drop Manholes: Drop manholes shall be measured each. Payment shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, material, testing and incidentals required for a complete installation, including but not limited to excavation, crushed rock, frame and cover, steps, adjustment of height, invert forming, drop pipe, connection to manhole, connection to sewer line, backfilling, record drawings, and final cleanup.

E. Diversion Manholes: Diversion manholes shall be measured each. Payment shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, material, testing and incidentals required for a complete installation, including but not limited to excavation, concrete, frame and cover, gate frame and gates, steps, adjustment of height, invert forming, connection to sewer line, backfilling, record drawings, and final cleanup.

F. Sewer Main Cleanouts: Sewer main cleanouts installed at the terminal end of a sewer main shall be measured each. Payment shall be at the contract unit price on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, material, and incidentals required for a complete installation, including but not limited to excavation, concrete, frame and cover, fittings, backfilling, record drawings, and final cleanup.

G. Connection to Existing Manhole: Connections to existing manholes shall be measured each. Payment shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, material, and incidentals required for a complete installation, including but not limited to excavation, cutting into the existing manhole, grouting, fittings, removing the existing invert, pouring and forming a new invert, backfilling, record drawings, and final cleanup.

H. Manhole Abandonment: Abandonments of manholes shall be measured each. Payment shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, material, and incidentals required for a complete abandonment, including the removal of the top section, plugging connecting sewer pipes, backfilling the manhole, and compacting the soil to prevent subsidence and to bring it to the same level as the surrounding grade, record drawings, and final cleanup.

I. Sewer Video Inspection: Post construction sewer video inspection shall be measured in linear feet along the centerline of the televised pipe. Payment for sewer video inspection shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, video records, and incidentals required for a complete inspection. Recordings shall be provided on the specified media and in the specified format.

SUBMITTAL REVIEW FORM
SECTION 06 - SANITARY SEWER

DATE INITIALS Submittal No. _____

Received by ENGINEER: _____ _____ Project No. _____

Received by OWNER: Contract No.

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
06.03.A.1	PVC Sewer Pipe		
06.03.A.2	Ductile Iron Pipe		
06.03.A.3	Fittings		
06.03.B	Manholes (Base, Riser, Cone)		
06.03.B.3 & B.5	Manhole Frame, Cover, Adjustment/Grade Rings		
06.03.B.4	Manhole Steps		
06.03.B.12	Waterstops		
06.03.B.11	Manhole Jointing & Sealing Materials		
06.03.C	Sewer Main Cleanouts		
06.11	Sewer Main Testing (Alignment, Deflection, Watertightness, Video)		
06.11	Manhole Testing (Vacuum/Hydrostatic)		

	Signature	Date
CONTRACTOR:		
OWNER		

TECHNICAL SPECIFICATIONS

SECTION 07 - SEWER SERVICE LINES

TP - 07.01 SCOPE:

The work covered under this section consists of furnishing all equipment, labor, materials, and incidentals necessary for the complete installation of a sewer service line and accessories, in strict accordance with the applicable drawings, the provisions of ASTM D2321 (latest revision), and these Technical Provisions.

TP - 07.02 GENERAL:

The Contractor shall provide all labor, equipment, and materials required to install the residential sewer service line indicated on the site layout plans. Installation shall include necessary fittings for connection to the building sewer stub-out, tapping of the sewer main and installation of the wye fitting or wye saddle as required. Contractor shall verify the location, size, and type of building sewer service line stub-out. Service line staking and staking for new sewer main tap shall be performed by the Contractor and approved by the Owner or Owner's Representative. Locating existing utilities shall be the responsibility of the Contractor in coordination with a representative from the operating utility. Existing sewer service lines will be properly abandoned in place and all facilities located at ground surface shall be removed and disposed of at the Contractor's expense.

All permits, permissions or other authorizations required by the tribal or municipal utility authority for tapping and connection are the responsibility and cost of the Contractor. Contractor shall contact each resident or business to verify the time that sewer service will be disconnected during service line tie-in. Connection to existing service or utilities, or other work that requires the temporary shutdown of any existing services shall be planned and coordinated with the operating utility. Excavation, trenching, backfilling, compaction and any needed dewatering shall be completed in accordance with Section 01 of the Technical Provisions, unless specifically altered under other requirements of this specification section.

Pipe joints and fitting installation shall be in accordance with the manufacturer's recommendations. The work will not be accepted until satisfactory backfilling, compaction and cleanup is complete. Final grading should prevent surface water runoff from pooling around installed facilities. If the work does not meet the specified requirements of this section, the Contractor shall remove and replace at the Contractor's expense. The Contractor shall leave each premise in a neat and orderly condition, restoring it as near as possible to its original condition and to the approval of the Owner or Owners' Representative.

TP - 07.03 MATERIALS:

Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.

The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Inspect all materials prior to installation to ensure that they are in new condition. Inspect pipe and fittings for defects. Plastic pipes with scratches, gouges, grooves or discoloration shall be rejected. Remove all materials from site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications.

A. Pipe and Fittings: All pipe and fittings required for completion of the sewer service line installation shall meet the requirements of the latest revision of ASTM D 3034.

   1. All service line piping shall be 4 inches PVC unless otherwise directed. Pipe shall be nominal size, SDR-35, 0.120 inch minimum wall thickness.

   2. Joints shall be bell-ended conforming to ASTM D 3212. All joints and connections in the pipe shall be watertight. Use elastomeric gaskets conforming to ASTM F477. Lubricants used for the joint

installation shall meet the requirements of the pipe manufacturer.

3. The standard pipe length shall be 20 feet. Each length of pipe shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, PVC Cell Classification, Type PSM PVC Sewer Pipe, ASTM Designation and Pipe Class.

4. Rigid couplers shall be used for all connections, such as PVC fittings, shielded Fernco fittings, or approved equal. Non-rigid couplers equal to Fernco may be used for the first connection from the home to the sewer service line if approved by the Owner or Owner's Representative.

B. Cleanouts: Double service line (two-way) cleanout piping and fittings shall be 4-inch diameter PVC pipe matching the chosen septic drain piping material. The cleanout piping and cap shall be threaded.

1. The cleanouts shall be installed with a brass hex socket plug equal to Tyler A Low Square Head cleanout plug. The cleanout ferrule shall be a Tyler 4-3 ½ or approved equal.

2. The poly seal foam wrapped around the cleanout ferrule shall be Sill Seal underlayment foam or approved equal.

3. The double service line cleanout shall be installed in a 20-inch x 40-inch x 4-inch concrete pad (collar) as shown in the detail drawings. The wire mesh used for the concrete pad shall be ASTM approved W 1.4 (1/8 inch) wire mesh on 6 inch centers.

C. Sewer Saddles:

1. For connecting to existing PVC sewers, sewer saddles shall be PVC conforming to ASTM 3034, water tight with a gasket as manufactured by Royal Building Products (saddle wyes with locating ring and gasket), GPK Products, or approved equal.

2. For connecting to vitrified clay, concrete, or asbestos-cement sewer pipe, a neoprene rubber boot with stainless steel bands shall be used.

3. Saddles and fittings shall be of a "wye" configuration. "Tee" saddles and fittings shall not be allowed.

D. Pipe Hangers:

1. Shall be made of material compatible with the piping material.

2. Shall be of sufficient strength to support pipe at full capacity.

3. Shall not affect pipe integrity by abrading, cutting or bending of pipe.

TP - 07.04 INSTALLATION:

Verify that dimensions and elevations are as indicated on the plans.

A. Sewer Service Line: Sewer service lines shall be furnished and installed by the Contractor from the sewer main to the point of connection as shown on the plans or as directed by the Owner or Owner's Representative.

1. Connection to Building:

a) Sewer service lines shall be connected to the building stub out sewer drain with approved fittings or rigid couplers which shall be installed in accordance with the manufacturer's recommendation.

b) If clamps/bands are required on the couplers, they shall be at a minimum 300 series stainless steel. All stainless steel bands shall be wrapped in PVC tape.

c) For connecting beneath the home, place pipe hangers at a maximum distance of 4 feet apart for horizontal PVC pipe.

d) Minimum cover over solid sewer pipe shall be 12-inches or as approved and shown on the plans.

2. Pipe Slope and Bends:

   a) The grade from the building to the sewer main connection shall be uniform.

   b) Minimum slope shall be ¼-inch per foot or 2%. Maximum slope shall be ½-inch per foot or 4%.

   c) Any changes or deviations in line alignment shall be made with bends not exceeding an angle of 45 degrees and shall obtain approval from the Owner or Owner's Representative prior to making change.

   d) Connections to existing building drains which result in a change of direction of the line by more than 45 degrees requires the installation of a two way cleanout at that location.

   e) There shall be no 90-degree bend fittings in the sewer service line between the building and the sewer main.

3. Pipe Installation Requirements:

   a) Installation of pipe, including joint lubrication and assembly, pipe bending, and joint deflection shall be in accordance with the manufacturer's recommendations and ASTM D2321.

   b) Sewer service lines and connections must be constructed with maximum joint deflection not to exceed the manufacturer's recommendations and in no case shall exceed one (1) inch per foot in any joint. Larger changes in direction must be made by use of standard 1/16 or greater bends.

   c) Spigot end of pipe shall be pointed in the direction of flow (bell pointing upstream).

   d) When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, or foreign substances will enter the pipes or fittings.

4. Warning Tape:

   a) Warning tape shall be installed along the sewer service line from the sewer main wye to the two way cleanout connection.

   b) Warning tape shall be installed in accordance with the provisions of TP 01.

5. No Building Connection:

   a) In cases where the sewer service line is not connected to the building, a PVC cap shall be solvent welded to the service line terminus within 5 feet of the proposed building.

   b) A piece of No. 3 rebar, 1-foot in length shall be installed to mark the service line terminus, as shown on the detail drawings. Bury the rebar 6 inches below ground surface.

   c) A PE marker painted green shall also be installed at this same location.

B. Cleanouts: Sewer service line cleanouts shall be installed at the locations indicated in the plans and in the manner indicated on the detail drawings. Required fittings shall be in conformance with the provisions of TP-07.03.

1. Locations:

   a) A two-way cleanout shall be installed within ten (10) feet of the building or as shown on the plans.

   b) Additional service line clean-outs shall also be two-way cleanouts and shall be installed for each series of bends totaling 90 degrees, at 100 foot intervals, or as directed by the Owner or Owner's Representative or shown on the plans.

   c) Fittings shall not be greater than 45 degrees (1/8 bend) on lines carrying untreated sewage.

   d) Cleanout shall allow for rodding/snaking the sewer line both towards the building and towards the sewer main.

2. Cleanout Configuration:

   a) Install wyes in the sewer service line to construct the cleanout and connect risers of the same material from the wye to the ground surface.

   b) Attach a no-hub iron body tapped, clean-out adapter, and threaded brass plug to the end of the riser.

   c) The cleanout shall be extended so that the top face of the threaded plug is at the finished grade of the concrete pad.

   d) Non-setting pipe-thread sealant shall be used on the plug threads, such as Teflon T Plus 2 or equal.

   e) A single layer of sill seal foam shall be wrapped around the iron body cleanout adapter between the exterior of the adapter and the concrete pad to protect against tightening from concrete expansion.

3. Concrete Pad/Collar:

   a) The concrete used shall meet the requirements of TP 02.

   b) The concrete pad shall be constructed around the cleanout at the ground surface per the detail.

   c) This concrete pad shall be reinforced with welded wire mesh with a minimum of ½-inch concrete over the mesh.

   d) Pour concrete collars on two-way cleanouts after the final site grading is complete to match finished grade.

C. Sewer Main Connection: Sewer service line connections to sewer main lines shall be made in accordance with the detail drawings and as shown on the plans, or as indicated by the Owner or Owner's Representative. The Contractor shall connect the service line to the sewer main with the appropriate sized sewer wye fitting or sewer wye saddle as shown on the detail drawings.

The time and method of connection to existing sewer mains shall be approved by the Owner or Owner's Representative prior to such connection. In no case shall a tapping method be approved that does not provide for a water tight connection to the sewer main. Any damage to sewer mains or property incurred during the tapping process shall be repaired by the Contractor at his own expense and in a method approved by the Owner or Owner's Representative.

1. Connections to New Sewer Mains:

   a) The Contractor shall furnish and install new 4-inch wye fitting branches on new sanitary sewer mains as shown in the plans.

   b) Verify the branch wye is no more than 45 degrees from horizontal.

   c) Install solvent weld cap or a plug in the wye and leave in place until service line construction begins.

   d) Install riser at an angle equal to or less than 45 degrees measured from horizontal. A single length of lateral pipe should be used for the riser section whenever possible.

   e) Extend sewer service line riser from sanitary wye to an elevation that will allow for a service line to be laid at specific approved grades.

   f) Proper compaction shall be provided beneath the riser and lateral connection to minimize or eliminate settlement from the resulting loading at this connection.

   g) In situations where sewer service lines are installed with the installation of new sewer main, the sewer service lines shall be included with the sewer main pressure testing. The individual service

lines shall be tested by plugging the service line termination point prior to connecting to the building and plugging sewer cleanouts and then testing concurrently with the sewer main section to which it is connected. The sewer service line can also be tested to a stub-out plug right before the new two way cleanout closest to the building.

2. Connections to Existing Sewer Mains:

   a) Connection to existing sewer mains shall be made with approved saddles and installed in accordance with the manufacturer's recommendation.

   b) Rotate the saddle no more than 45 degrees from horizontal.

   c) The saddle shall be fastened with a minimum of two (2) stainless steel clamps/bands using stainless steel connectors or equal for the approved saddle. All stainless steel bands shall be wrapped in PVC tape.

   d) Install riser at an angle equal to or less than 45 degrees measured from horizontal.

   e) Extend sewer service line riser from sanitary wye to an elevation that will allow for a service line to be laid at specific approved grades.

   f) Proper compaction shall be provided beneath the riser and lateral connection to minimize or eliminate settlement from the resulting loading at this connection.

TP - 07.05 WATER AND SEWER CROSSINGS:

Separation distances between sewer service lines and water lines shall meet the requirements of TP 01.

A. All water and sewer service lines within five (5) feet of the house will be considered as part of the building plumbing.

B. For new construction, all water and sewer service lines shall have a 10 foot minimum horizontal separation. This can best be accomplished by having the water and sewer service lines exit the house 10 feet apart or from different sides of the house.

If the 10 foot separation cannot be maintained, the service lines may be laid closer together than 10 feet if all of the following conditions are met:

A. Prior written approval is obtained from the Owner or Owner's Representative.

B. The top of the water service line is at least 12 inches above the bottom of the sewer service line.

C. The water and sewer lines are continuous with no joints until the 10 foot separation requirement is met.

TP - 07.06 RECORDS DRAWINGS:

The requirements of Technical Provision 01 must be met. Failure to properly identify the required items will result in the Contractor having to uncover pipe at Contractor’s expense to verify their location. The record drawings shall become the property of the Owner after contract completion. In addition to the requirements of TP-01, the drawings shall include the following at a minimum:

A. Tapping point at sewer main (sewer wye fitting or wye saddle)

B. Intersection point with other utilities

C. Location of cleanouts

D. Location of bends

E. Point of connection to the building stub-out

F. Each underground installed facility

TP - 07.07 MEASUREMENT AND PAYMENT - SEWER SERVICE LINES:

A. Sewer Service Lines: PVC sewer service pipe shall be measured in lineal feet along the centerline of the pipe, including fittings. Payment for sewer service lines shall be at the contract unit price shown in the Bid Schedule. Payment shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation; including, excavation, bedding, stabilization material, compaction, pipe installation, sewer wye or sewer saddle, connections to the sewer service cleanout, fittings, warning tape, trench backfilling, record drawings, and final clean-up.

B. Cleanouts: Payment for the two-way cleanouts shall be at the unit bid price as stated in the Bid Schedule. Payment shall be full compensation for furnishing all labor, equipment, materials and incidentals required for complete installation; including excavation, backfill, compaction, pipe installation, fittings, connections, foam, reinforced concrete pad, record drawings, and final cleanup.

SUBMITTAL REVIEW FORM, SECTION 07- SEWER SERVICE LINES

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
07.03.B	PVC Sewer Pipe & Fittings		
07.03.C	Cleanout, Fittings, Cap, Foam, Mesh, Concrete		
07.03.D	Sewer Main Saddle or Wye and Fittings		
	Permits (if required)		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 11 - ROADWAY, RAILROAD, AND SPECIAL UTILITY CROSSINGS

TP - 11.01 SCOPE OF WORK:

Specifications included herein are intended to support requirements of Section 01 of these Technical Provisions where road, railroad, and special utility crossings are necessary for the installation of sanitation facilities under this contract.

Construction shall comply in all respects to the requirements of any permit incorporated into this contract. Copies of applicable permits obtained by the Owner shall be included in the Appendix to these Technical Provisions. The Contractor shall meet all requirements and conditions of these permits with respect to materials, equipment, notification and timing. At least two days notice shall be given to the Owner or Owner's Representative and permit grantor before work is done on any crossing. Any permits not previously obtained by the Owner shall be the responsibility of the Contractor.

Requirements of the permit or permits shall control if contradictions exist between Technical Provisions and such permits. All work within the right-of-way of roads shall be performed in accordance with the "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-14 – Division 600". At least two (2) weeks prior to performing the crossing, the Contractor shall submit a signed and dated traffic control plan showing how they intend to safely control traffic in the area of the crossing for review and approval by the Owner and the respective road authority. For road crossings, the Contractor shall have at least one lane open to traffic at all times unless otherwise required by traffic control plan.

The work to be completed under these Technical Provisions includes the furnishing of all labor, materials, transportation, tools, supplies and appurtenances necessary to complete the crossings in accordance with the indicated requirements.

TP - 11.02 ROADWAY CROSSINGS:

Where so indicated on the plans, main pipeline crossings of highways, railroads, canals, and other structures shall be made by installation of a steel pipe casing under the structure as shown on the plans. The casing pipe shall be installed where indicated on the plans and at the locations designated by the Owner. Casing pipe 8-inches in diameter and larger shall be Grade A steel pipe with a minimum wall thickness of 0.375 inches and shall meet ASTM A-53 or ASTM A-120 (Welded and Seamless Steel Pipe). Steel pipe shall conform to: ASTM A53 Grade B, Type E or S; ASTM A 139 Grade B; ASTM A 106 Grade B or C; API 5L Grade B or Grades X42 to X56.

The casing pipe for water service lines and sewer service lines shall be standard weight galvanized steel pipe conforming to ASTM A-120 (Welded and Seamless Steel Pipe). Crossings for water service lines and water mains shall be a minimum of four (4) feet below the surface of the roadway and two (2) feet below other structures and canal inverts unless otherwise shown on the plans.

The method of installing the carrier pipe within the steel casing shall be approved by the Owner. Pipe within casings shall be installed in the encasement pipe as shown on the plans providing suitable spacers that will prevent disturbance of the assembled joints. Redwood and cedar wood casing spacers will not be allowed. The casing spacers shall be installed per manufacturer's specifications. Casing spacers shall be boltless and non-metallic as manufactured by GPT, Calpico or approved equal. After the carrier pipe is installed in the casing and tested, both ends of the encasement shall be sealed to prevent the entrance of foreign objects into the casing. Casing end seals shall be manufactured by GPT, Calpico or approved equal. All water and sewer lines installed within the casing pipe shall be installed with mechanical restrained joints on every pipe joint within the casing pipe.

A. Open Cut Crossings:

1. Unpaved Roads: Excavation and backfilling of unpaved roads shall be done in accordance to Technical Provision Section 01.

2. Paved Roads: Excavation and backfilling of paved roads shall be done in accordance to Technical Provision Section 01. The lean concrete backfill shall meet the requirements of the Federal Highway Administration Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-14, Section 614-Lean Concrete Backfill

B. Bored Road Crossing: Where only bored road crossing shall be permitted as indicated on the plans, the Contractor shall furnish all equipment, material, and labor required to complete the installation. Boring methods which involve jetting or washing techniques are not allowed. Alternate methods of road boring must be approved in writing by the applicable permit granting authority or right-of-way authority and the Owner or Owner's Representative. The use of water under pressure jetting or puddling shall not be permitted to facilitate boring, pushing, or jacking operations.

Maintain alignment of the borehole such that all grades and alignment of the pipeline are as shown in the plans. Failure to maintain such grades and alignment will result in rejection of the crossing for payment. Such operations shall be scheduled so that it may be completed from start to finish without delay and in accordance with appropriate permits and the standards.

When the casing pipe is to be installed by boring, the casing shall be kept on line and grade by suitable guide rails in the approach pit. The deviation from line and grade of the casing pipe shall provide installation of the carrier pipe within the following allowances:

Lines	Horizontal Deviation	Vertical Deviation
Water Line	1.0 ft per 100 feet (1.0%)	1.0 ft per 100 ft (1.0%)
Sewer Line	1.0 ft per 100 feet (l.0%)	0.1 ft per 50 ft (0.2%)

Deviations will be determined from the line and grade approved by the Owner. The casing pipe for all crossings shall be installed in a manner that will allow for the installation of the carrier pipe in a straight line without contacting the walls of the casing. Casings for the carrier pipe shall be installed prior to the installation of pipe within 100 feet of the crossing for the main or service line under construction.

If excessive voids or too large a bored hole is produced during casing or pipeline installations, or if it is necessary to abandon a bored or tunneled hole, prompt remedial action shall be taken by the Contractor. All voids or abandoned holes caused by boring or jacking are to be filled by pressure grouting. The grout material shall be as specified by the permit granting authority or right-of-way authority and approved by the Owner or Owner's Representative. The hole diameter shall not exceed the outside diameter of the casing pipe (including coating) by more than two (2) inches on casings with an inside diameter greater than twelve (12) inches.

TP - 11.03 ROADWAY RESTORATION:

Road restoration shall be done in accordance with Section 01 of these Technical Provisions.

TP - 11.04 BARRICADES, GUARDS AND SAFETY PROVISIONS:

The Contractor shall be responsible for erecting and maintaining adequate barricades, construction signs, torches, red lanterns, flagmen, and guards, as required, during the progress of the construction work and until it is safe to resume use of the roadway. Rules and regulations of the permit granting authority or right-of-way authority regarding safety provisions shall be observed. All work within the right-of-way of roads shall be performed in accordance with the latest edition of the Manual on Uniformed Traffic Control Devices (MUTCD). Work within right-of-ways and traffic control plans shall comply with all applicable provisions of Section 01 of the Technical Provisions in addition to those indicated under provisions of this Section.

TP - 11.05 RAILROAD AND SPECIAL UTILITY CROSSINGS:

Railroads and other specialized utility crossings shall comply with all requirements of the permits indicated. Pipeline alignment and grades shall be maintained as shown on the plans. The Contractor shall be responsible for compliance with all requirements of special crossing permits applicable to this project. Copies of such permits shall be included in the Appendix of these specifications. If no special crossing permits are appended, and such crossings are indicated on the plans, crossings will comply with all applicable provisions of Section 01 of these Technical Provisions in addition to those indicated under other provisions of this Section. At least two (2) days of notice shall be given to the Owner or Owner's Representative and right-of-way authority or permit granting authority before work is done on any crossing.

TP - 11.06 CLEANUP:

Upon completion of the work, the entire site shall be cleared of all debris, and the ground surface shall be finished to smooth and uniform slopes. Cleanup shall be considered an incidental item and no additional payment shall be made for it. All of the right-of-way area and structures shall be left in a condition at least equal to their condition prior to construction.

TP - 11.07 MEASUREMENT AND PAYMENT:

Payment for bored roadway, open cut roadway, railroad or special utility crossings shall be measured in linear feet along the centerline of the casing. Payment shall be full compensation for all materials, equipment, labor, and incidentals for a complete installation including, but not limited to, boring, asphalt cutting, excavation, encasement and carrier pipe, carrier pipe connection fittings and joint restraints, blocking/casing spacers, backfilling, paved and gravel roadway restoration, barricades, guards and safety provisions, traffic control plan, cleanup, and record drawings. Such payment shall also be full compensation for all required certificates of insurance, development of approved traffic control plans and implementation of traffic control.

SUBMITTAL REVIEW FORM

SECTION 11 – ROADWAY, RAILROAD, AND SPECIAL UTILITY CROSSINGS

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
11.01	Permits		
11.02	Boring Method		
11.02	Casing		
11.02	Casing Spacers		
11.02	Casing Seal		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 42 - SEWAGE LIFT STATION

TP - 42.01 SCOPE:

A. The work covered by this section consists of furnishing all plant, labor, equipment and materials in connection with the installation of a new wastewater lift station, including all necessary appurtenances for complete and operational installation and in accordance with these technical provisions and applicable drawings.

B. All electrical work shall be performed by a licensed electrician and in accordance with state regulations, the National Electrical Code (NEC), and local power company requirements, as applicable.

C. All electrical materials and components shall be new and labeled as approved by the Underwriters Laboratories.

D. All materials to be furnished shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design.

TP - 42.02 MATERIALS:

A. Wet Well:

1. General:

a. The lift station wet well and risers shall be precast reinforced concrete, precast polymer reinforced concrete, or fiberglass reinforced plastic.

b. The wet well barrel sections shall have an inside diameter and depth as shown on the plans.

c. Concrete and reinforcement shall conform to ASTM C478. Reinforcing steel shall also conform to Section 03 of these Technical Provisions.

d. Wet wells shall be designed to withstand all live loads and dead loads as described in project plans and specifications. Dead loads shall include overburden load, soil side pressure and hydrostatic loading conditions. Wet well shop drawings shall be sealed by a licensed Professional Engineer.

e. Wet well wall thickness shall be designed to resist hydrostatic pressures with a minimum safety factor of 2.0 for full depth conditions from grade to invert.

f. Wet wells shall be designed with sufficient bottom anchorage and side friction to resist buoyancy. Field cast floatation collars are acceptable.

g. The wet well shall be manufactured in one class of load rating.

h. All wet wells, valve vaults, and other such buried structures that are not subject to vehicular traffic, including their associated lids and covers, shall be designed utilizing a minimum 300 pound per square foot load bearing design.

i. All wet wells, valve vaults, and other such buried structure that are subject to vehicular traffic, including their associated lids and covers, shall be designed utilizing an H-20 traffic load bearing design.

j. Wet well structures shall have engineered and rated lifting devices that shall not penetrate through the wall.

2. Precast Reinforced Non-Polymer Concrete:

a. The wet well barrel sections shall be the diameter shown on the plans with an 8-inch minimum wall thickness.

b. The wet well base section shall be the diameter shown on the plans with a minimum thickness of 8 inches, unless otherwise indicated on the plans.

c. The wet well base section shall extend a minimum of 12 inches beyond the outside diameter of the barrel sections, for protection against flotation, unless otherwise shown on the drawings.

d. Openings to receive pipe shall be circular, tapered inward, and held to the minimum size practical to accommodate the pipe to be inserted and to effectively seal the joint.

e. The wet well base section shall be precast or poured in place.

3. Precast Reinforced Polymer Concrete:

a. In no cases shall the wall thickness be less than 4 inches for 60" diameter and larger and 3" for 48" diameter.

b. The manufacturer shall use only polyester or vinyl ester resin systems designed for use with this particular application.

c. Resin content shall be a minimum of 7% by weight. All aggregate, sand and quartz powder shall meet the requirements of ASTM C 33, where applicable.

d. Resin additives, such as curing agents, pigments, dyes, fillers and thixotropic agents, when used, shall not be detrimental to the wet well.

e. Manufacturer of wet wells shall employ manufacturing methods and material formulation in use for a minimum of 5 years. Manufacturer of wet wells shall have been actively producing wet wells under current name for a minimum of 7 years with no more than one year between wet well projects. References demonstrating this requirement shall be submitted for review.

f. Polymer concrete wet wells shall be manufactured by U.S. Composite Pipe, Inc. or equal.

g. Polymer concrete wet wells shall be manufactured in accordance with ASTM C 478.

h. Polymer concrete shall have a minimum unconfined compressive strength of 9,000 psi when measured in accordance with ASTM C 497.

i. The wet well base section shall be precast or poured in place. However, any non-polymer concrete used with the installation of a polymer wet well and exposed to sewage shall be coated in accordance to this Section 42 of the Technical Provisions. This shall include floor, pump sump, flow channels, etc.

4. Fiberglass Reinforced Plastic Wet Well:

a. The contractor shall provide a fiberglass reinforced plastic (FRP) underground wet well manufactured by Xerxes Corporation or approved equal. The wet well shall be installed according to the manufacturer's instructions.

b. Fiberglass reinforced plastic shall conform to ASTM D3753.

c. FRP laminate shall be constructed to withstand or exceed two times the assumed loading at any depth of the wet well.

d. Wet well shall support accessory equipment, such as inlet and outlet piping, when installed according to wet well manufacturer's current installation instructions.

e. Wet well shall be vented to atmospheric pressure.

f. Any portion of the wet well exposed to sunlight shall be UV protected.

g. Wet well shall be manufactured with 100% resin and glass fiber reinforcement. Sand-fillers are not permitted.

h. Wet well and accessories shall be constructed using premium isophthalic/terephthalic polyester resin.

i. The finished FRP laminate will have a Barcol Hardness of at least 90 percent of the resin manufacturer's specified hardness for the fully cured resin.

j. Wet Well Bottom and anti-flotation Flange:

i. Anti-flotation flange shall have a greater diameter than that of the wet well to provide anti-flotation benefits.

ii. When installed, the anti-flotation flange shall be attached with the same FRP resin and glass as that used to manufacture the body of the wet well.

iii. The wet well bottom shall be designed for service according to drawings.

iv. FRP pipe stubs or nozzles shall be used for inlet and outlet piping. All FRP nozzles shall be flat faced and flanged, and shall conform to ANSI B16.5 150# bolting pattern. Locations shall be as indicated on drawings.

5. Wet Well Concrete Liner/Coating:

a. Concrete wet wells containing no polymer shall be coated to protect against corrosion. This includes any concrete used to create the floor, pump sump, underside of wet well cover, or channels.

b. The liner in the wet well shall consist of a coating/lining system that has an underlayment material and a surface finish coat.

c. The exterior of the non-polymer wet well surface shall be coated for the purpose of water proofing with 2 coats of coal tar epoxy or equal

d. Interior coatings/linings shall be applied in accordance with the manufacturer's recommendations, with the exception that the thicknesses required in these specifications shall apply.

e. The approved coating/lining system shall include the following products. Sprayable or trowelable formulations of the products listed below are acceptable.

i. Sauereisen Sewergard Lining No. 210 as manufactured by Sauereisen Cements, Pittsburgh, PA

ii. Sewer Shield 150 Epoxy Lining as manufactured by Environmental Coatings, Mesa, AZ

iii. Raven 405 Epoxy Lining as manufactured by Raven Lining Systems, Tulsa, Oklahoma

iv. COR+GARD 100% solids, high-build epoxy lining as manufactured by Action Products Marketing (AP/M) of Johnston, IA

v. Novocoat Superior Environmental Products SL-100 (trowel on) or Superior Products SP-2000R (spray on) as manufactured by Novocoat, Addison Texas

vi. Neopoxy NPR 5300 Series Epoxy Lining by Neopoxy International, Hayward, CA

f. Coating Experience:

i. Coating applicators shall have a minimum of three (3) years of experience in applying coatings in manholes and/or lift station wet wells.

ii. The coating applicator shall submit a successful "Performance History" for applying coatings in manholes and/or lift station wet wells during the previous three (3) years.

g. Surface Coating Application:

i. After the wet well has been prepared and the underlayment applied, the approved surface coatings shall be applied.

ii. The surface coating that is applied shall be from the same coating system as the underlayment that is used.

iii. The wet well shall be prepared for the surface coating per the manufacturer's requirements. Unless specified by manufacturer, if surface texture is not uniform in appearance, water or abrasive blasting shall be repeated until the required surface is obtained. Additional water or abrasive blasting shall be at no additional cost to the Owner.

iv. The approved surface coating shall be mixed in a clean, dry mixing container. The surface coating shall be mixed as per the manufacturer's recommendations.

v. For all coatings, trowel marks and other surface irregularities shall be removed according to the manufacturer's requirements.

vi. The required total cured thickness for the surface coating layer (not including the anti-pinholing layer) for all coating systems shall be 1/8-inch.

vii. Compound that has begun to set shall not be recovered by adding additional liquid but shall be discarded.

viii. Do not allow flowing water, chemicals or other liquids on the approved, applied coating for a minimum of 4 hours after installation.

h. Each coat shall be a contrasting color. The final coat shall be white.

i. Spark Testing: After the approved coating has been applied to all specified surfaces, the coated surfaces shall be spark tested.

i. Testing shall be with a minimum test voltage of 100 volts per mil (where 1 mil = 1/1000-inch) of finished surface coat thickness. For example, a minimum of 12,500 volts shall be used for a surface coat of 1/8-inch (125 mils).

ii. All detected holidays shall be marked and repaired by abrading the coating with grit disc paper or other hand tooling method and refilled. The patch material shall be a contrasting color and shall be trowelable. Repaired areas shall be re-tested.

iii. The Contractor shall perform repairs and re-testing at no additional cost to the Owner. The Owner or Owner's representative or his/her designated representative shall observe and approve of all testing and retesting. In addition, the Contractor shall provide certification for the wet well stating that the coating is free of holes or other imperfections.

j. Any spilled or over-sprayed material must be cleaned-up prior to curing. After curing has occurred, clean-up may be accomplished by chipping or blasting. All discarded materials shall be disposed of properly. Clean-up and disposal of discarded material shall be at no additional cost to the Owner.

k. Materials shall be delivered to the site in factory sealed and labeled containers. Date of manufacture shall appear on each container. Materials shall be handled and stored according to the strictest requirements of the manufacturer and in accordance with all local, state, tribal, and federal laws and regulations.

6. Wet Well Fittings and Accessories: All cables and exposed connections shall be suitable for a wet,

corrosive and/or abrasive environment. All hardware within the wet well shall be 316 stainless steel.

a. Precast Polymer and Non-Polymer Concrete Section Joint Sealant Gaskets.

   i. Concrete wet well sections shall be connected with an elastomeric sealing gasket as the sole means to maintain joint water-tightness, and both the gasket material and the wet well joint shall meet the requirements of ASTM C443.

   ii. Sealant gaskets shall be Ram-Nek, Kent Seal, or equal. The use of mortar to seal joints will not be allowed.

b. Wet Well Penetrations: All pipe penetrations through the wet well shall be equipped with waterstop devices conforming to ASTM C923. Waterstop devices shall be equal to Kor-N-Seal 106-406 Series manufactured by Trelleborg.

c. Vent:

   i. The lift station vent shall be of stainless steel construction and shall be a minimum of 6 inches in diameter. The actual size of the vent shall be shown on the drawings.

   ii. The vent shall be equipped with a 24 mesh stainless steel mesh screen. The method of attaching the screen to the vent shall be subject to the approval of the Owner or Owner's representative.

d. Access Cover and Frame:

   i. The wet well top shall be concrete for concrete wet wells, polymer concrete for polymer concrete wet wells, and aluminum for fiberglass wet wells.

   ii. Unless the plans require that the wet well utilize a H-20 traffic load bearing design, the access cover and frame shall be of double leaf construction with a loading rate of 300 pounds per square feet and a lifetime guarantee equal to a Halliday Products model S2R6060 locking aluminum cover.

   iii. The cover dimensions shall be maximized in both length and width and shall be equipped with an extruded aluminum angle frame with ¼" diameter by 3 inch long anchors and automatic T-316 stainless steel hold-open arm with release handle, T-316 stainless steel hinges and hardware, recessed locking bolt, a spring assisted ¼" thick aluminum diamond plate door with recessed lifting handle, torsion springs, neoprene bridge pads, and shall be capable of opening to a 90 degree angle.

   iv. The duplex aluminum access cover shall be equipped with a protective grating panel as manufactured by Halliday Products or approved equal.

   v. The grating shall be 1-inch aluminum "I" bar grating with a powder-coated finish.

   vi. Grating shall be hinged with tamper proof stainless steel bolts and shall be supplied with a positive latch to maintain the grating in an upright position.

   vii. A 6-inch clear viewing area shall be provided on each lateral unhinged side of the grating panel, for visual observation and limited maintenance procedures.

   viii. A padlock hasp for an Owner-supplied padlock shall be provided.

e. Guide Bar Brackets:

   i. The guide bar brackets shall be of 316 stainless steel construction as manufactured by ITT Flygt or equal.

   ii. Intermediate Guide Bar Brackets shall be installed when guide bars are over 20 feet long as recommended by the manufacturer.

iii. The guide bar sizes shall be as shown on the drawings.

f. Pipe Sway Bracing: Bracing shall be constructed with 316 stainless steel plates, uni-strut, u-bolts, bolts, and nuts as shown in the plans.

g. Trash Basket: If required on the plans, the Contractor shall furnish and install a bar screen style trash basket with all stainless steel basket and aluminum rails equal to Halliday Products model B4B. The basket shall have 2-inch clear opening between 1/4-inch and solid sides. The guiderails shall be of 3-inch structural aluminum channel. The trash basket assembly shall not be used as a ladder. Aluminum basket stops shall be supplied loose for field mounting to insure proper basket position.

h. Float Switch Bracket: A float switch bracket shall be installed to keep floats at the levels shown on the plans and to keep the float cords from tangling in tanks. All brackets and mounting hardware shall be stainless steel.

B. Submersible Pump:

1. General:

a. Pump shall be submersible, non-clogging, electrically operated, designed specifically for use in municipal wastewater applications and capable of handling raw unscreened sewage with minimum three inch diameter solid spheres.

b. The pump manufacturer and model, curve number, and operating conditions (flow vs. total dynamic head), and power supply (phase, volts, and hertz) shall be indicated on the drawings.

c. Brass or stainless steel nameplates giving the name of the manufacturer, voltage, phase, rated horsepower, speed, and any other pertinent data shall be attached to each pump.

d. The stator casing, oil casing, and volute shall be of gray iron construction, with all parts coming into contact with sewage protected by an alkyd resin primer approved by the Owner or Owner's representative.

e. All necessary foundation bolts, plates, nuts, and washers shall be furnished by the equipment manufacturer, and shall be of Type 316 stainless steel or better.

f. The pumps shall be Hydromatic, Flygt, Barnes or approved equal.

2. Motor:

a. All pump motors shall be built in accordance with latest NEMA, IEEE, ANSI and ABMA Standards, as applicable.

b. Pump motors shall be housed in a water-tight casing and shall have moisture resistant Class F insulated windings.

c. Pump motors shall have cooling characteristics suitable to permit continuous operation in a totally, partially or non-submerged condition. The pump shall be capable of running continuously in a non-submerged condition under full load without damage.

d. The motor shall be capable of ten starts per hour. A field running test demonstrating this ability, with 24 hours of continuous operation under the above conditions, shall be performed for all pumps being supplied, if required by the Owner before final acceptance.

e. All motors shall be designed with a minimum 1.15 service factor and be Explosion Proof listed.

3. Impeller:

a. The impeller shall be constructed of gray cast iron, ASTM A-48, class 30.

b. All external bolts and nuts shall be of Type 316 stainless steel.

c. Each pump shall be provided with a replaceable wear ring system to maintain pump efficiency.

d. One stationary wear ring provided in the pump volute or one rotating wear ring provided on the pump impeller shall be required.

4. Volute:

a. The volute shall be ASTM Class 30. It will consist of a centerline discharge one piece design.

b. The passages are to be large enough to pass the same solid size as the impeller.

c. The discharge and inlet flanges shall be ANSI Class 125 and be integrally-cast into the volute case.

5. Casing:

a. Stator casing and oil casing shall be gray iron construction with all parts coming in contact with sewage protected by a coat of air dry enamel applied before and after assembly.

b. All external bolts and nuts shall be Type 316 stainless steel.

c. A sliding guide bracket shall be an integral part of the pumping unit, and the casing shall have a machined connection with yoke to connect with the cast iron discharge connection.

6. Shaft:

a. The pump shaft shall be of Series 300 or 400 stainless steel or carbon steel.

b. The shaft and bearings shall be designed to meet the maximum torque required for any start-up or operating condition and to minimize vibration and shaft deflection.

7. Bearings:

a. The pump shaft shall rotate on two permanently lubricated bearings. The upper bearing shall be a heavy-duty radial single row ball bearing. The lower bearing shall be a two row heavy-duty angular contact ball bearing.

b. Bearings shall be lubricated for life from the factory through the non-toxic, low viscous, dielectric oil in the frame.

c. Pump designs requiring periodic scheduled bearing service shall not be considered equal or approved.

d. Single row or sleeve lower bearings shall not be acceptable.

8. Mechanical Seals:

a. Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals, each consisting of one stationary and one rotating ring with each pair held in contact by a separate spring, so that the outside pressure assists spring compression in preventing the seal faces from opening.

b. The compression spring shall be protected against exposure to the pumped liquid.

c. The pumped liquid shall be sealed from the oil reservoir by one face seal and the oil reservoir from the air-filled motor chamber by the other.

d. The seals shall require neither maintenance nor adjustment, and shall be easily replaced.

e. Conventional double mechanical seals with a single spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to openings and penetration by pumping

forces shall not be considered equal to tandem seal specified and required.

f. Pumps with single seals will not be acceptable or approved.

9. Sensors:

   a. Each motor shall incorporate a minimum of one ambient temperature compensated overheat sensing device and one moisture sensing device.

   b. Protective devices shall be wired into the pump controls to automatically shut down the pump if excessive temperature or moisture is detected.

   c. Protective devices shall be self-resetting.

10. Mix–Flush System:

   a. If a mix-flush system is required on the plans, flush valves shall be provided to flush and clean the pump sump by mixing the wastewater automatically before discharge.

   b. One pump of the two pumps in each lift station shall be equipped with a mix flush valve that will automatically flush the sump during initial operation of the pump.

   c. For each pumping period, the flush valve shall open, and water from the pump shall be forced through the valve into the sump as a jet flushing stream.

   d. A regulator shall be provided to adjust the flushing period between 20 and 50 seconds.

   e. The flush valve shall be mounted on the pump housing. The flush valve shall be installed according to the manufacturer's recommendations.

   f. The flush valve body shall have an epoxy coating, and the closing device shall be a cast iron ball.

   g. The system shall consist of an ITT Flygt 4901 Flush Valve or approved equal.

11. Discharge Connection:

   a. A sliding guide bracket shall be part of the pump casing and have a machined connecting flange to connect with a cast iron pump base elbow.

   b. The cast iron pump base elbow shall be bolted to the floor of the wet well with stainless steel anchor bolts and designed to receive the pump discharge flange without the need of any bolts or nuts.

   c. Sealing of the pumps to the pump base elbow shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit. This motion shall be guided by no less than two Type 316 seamless tubular stainless steel guides which will press it tightly against the discharge connection.

   d. No portion of the pump shall bear weight directly on the floor of the wet well.

   e. No rotary motion of the pump shall be required for sealing at the pump base elbow.

   f. Sealing at the pump base elbow by means of a diaphragm or similar method of sealing will not be accepted as an equal to a metal to metal contact of the pump discharge and pump base elbow.

   g. The design shall be such that the pumps shall be automatically connected to the discharge piping when lowered into place on the pump base elbow.

   h. The pumps shall be easily removable for inspection or service. No bolts, nuts or fastenings shall be removed for this purpose, and no person(s) shall enter the wet well.

12. Lift Chain:

a. Each pump shall be fitted with a Type 316 stainless steel chain of adequate strength to permit raising the pump for inspection or removal. The chain shall be attached to the pump handle with a stainless steel shackle and shall be of sufficient length to attach to the cable of the hoist winch.

b. A nylon rope shall be attached to the stainless steel chain and secured at the top cover of the lift station. The nylon rope shall facilitate the guiding of the winch lift cable to the pump lift chain.

c. The Owner shall be supplied with one Flygt "Grip Eye" device or approved equal to provide a simple hoist hook connection to the pump lift chain.

C. Portable Davit Crane:

1. The crane shall be configured with a manual winch.
2. It will be furnished with a Type 316 stainless steel cable.
3. The assembly shall consist of a pedestal base.
4. It shall be provided with a 2-year limited warranty.
5. The davit crane shall be a Thern Commander 2000 5PT20 or approved equal with a 2000-lb capacity and a powder coat finish.

D. Concrete Valve Vault:

If a concrete valve vault is required on the plans, the Contractor shall furnish and install a vault conforming to this section.

1. Concrete Valve Vault:

a. The concrete pre-cast utility vault shall be a rectangular vault with the dimensions shown on the plans as manufactured by Jensen Precast or approved equal.

b. The vault shall have a 6-inch minimum wall and floor thickness and shall be equipped with an aluminum ladder with pull-up extension.

2. Concrete Valve Vault and Access Cover:

a. Valve vault may not be required in warmer areas where piping may be exposed aboveground.

b. The access cover and frame shall be of double leaf construction with a loading rate of 300 pounds per square feet and a lifetime guarantee equal to a model number Halliday Products model S2R6060 locking aluminum cover.

c. The cover dimensions shall be as shown on the plans. The cover shall be equipped with an extruded aluminum angle frame secured using ¼"-diameter by 3-inch long anchors or as recommended by the manufacturer. The cover shall include an automatic T-316 stainless steel hold-open arm with release handle, T-316 stainless steel hinges and hardware, recessed locking bolt, a spring assisted ¼"-thick aluminum diamond plate door with recessed lifting handle, torsion springs, neoprene bridge pads, and shall be capable of opening to a 90-degree angle.

E. Discharge Pipe and Appurtenances:

1. Pipe and Fittings:

a. Lift station piping, restraint, and fittings inside the wet well, buried, or aboveground shall be installed in accordance with Section 43 of the Technical Provisions unless otherwise noted on the drawings.

b. Dismantling joint shall be AWWA C2017 Class D flanged and rated for 175 psi minimum pressure. The dismantling joint shall be equal to the Romac Industries, Inc. Style DJ400 Dismantling Joint.

c. Above ground ductile iron pipe shall be painted in accordance to the requirements of this section of the Technical Provisions.

2. Pressure Gauge: The pressure gauge shall be equal to an Ashcroft type 1279 grade 2A, 0-60 psi range, glycerin liquid filled, with a ¼-inch NPT connection and Ashcroft type 80 iso-ring, with Buna N inner flexible wall, carbon steel flanges, ¼-inch NPT instrument connection, glycerin liquid filled.

3. Check Valve:

   a. The check valve shall be a swing check valve of self-contained, free-swinging disc style with outside lever and weight equal to a Pratt Series 8001 AWWA Swing Check Valve Outside Lever and Weight.

   b. Valves shall conform to all standards set forth in AWWA C508, latest edition. Valves shall be a cast iron body with bronze seats, Buna-N disc inserts, and hinge pins of corrosion resistant stainless steel.

   c. Internal and external epoxy coating shall conform to AWWA C550. The valve shall be designed for horizontal installation and for uninterrupted continuous service.

   d. The flanges shall conform to ANSI B16.1 Class 125.

4. Plug Valve:

   a. Plug valves shall Val-Matic plug valve or equal and shall be rated at 175 psi minimum, and shall be equipped with resilient plug facing material, neoprene or hycar rubber, suitable for sewage service.

   b. The valve body, plug, and cover shall be Class B cast iron, ASTM A126.

   c. The port areas shall not be less than 100% of the pipe area for valves smaller than 4 inches, and shall not be less than 80% of the pipe area for valves between 6 and 16 inches.

   d. The valve seats shall be welded nickel overlay applied to the seating surface body and machined to a smooth finish.

   e. The valve shall have replaceable sleeve-type bearings in the upper and lower journals. The bearings shall be stainless steel or Teflon with non-metallic backing per AWWA C507 and AWWA C504.

   f. The valve shall have mechanical joint connections when buried, and NPT screwed end, grooved ends per AWWA C606, or flanged ends per ANSI Class 125 pound drilling pattern for exposed locations as shown on the drawings.

   g. Exposed valves larger than 4 inches shall be equipped with manually operated, gear actuators. Each valve shall be equipped with a lever operator so that the valve can be opened and closed.

5. Electromagnetic Flow Meter:

   a. The electromagnetic flow meter shall be installed as shown on the drawings.

   b. The metering system shall operate over a flow range of 0.10 to 39.4 ft/s.

   c. The metering system shall perform to an accuracy ± 0.25 percent of rate for velocities greater than 1.64 ft/s and ± 0.004 ft/s for velocities less than 1.64 ft/s.

   d. Electrode materials shall be standard alloy C. Pipe spool material shall be 316 stainless steel. Meter housing material shall be welded carbon steel. Flanges shall be 316 stainless steel or carbon steel meeting ANSI B16.5, Class 150.

   e. Liner material shall be PTFE. Meter shall be NSF approved.

f. Pressure rating shall be 150 psi.

g. Coil power shall be pulsed DC. Meter enclosure shall meet NEMA 4. Cable entries shall be ½-inch NPT cord grip. The display shall show both totalized flow and instantaneous flow.

h. Electromagnetic flow meter shall be equal to a M200 electromagnetic flow meter as manufactured by Badger Meter.

6. Sewage Air/Vacuum Valve:

a. The sewage/air vacuum valve shall allow unrestricted venting or re-entry of air through it during filling or draining of the force main to prevent vacuum.

b. The sewage air/vacuum valve shall incorporate (2) stainless steel floats directly connected by a stainless steel stem, to maintain an air gap between the bottom concave float and top shut-off float.

c. The air gap shall retard waste solids from fouling or clogging the top shut-off float. The internal baffle shall be fitted with a guide bushings and act to protect the shut-off float from direct air flow.

d. The baffle shall retain the Buna-N seat in place, without distortion for tight shut-off.

e. All internals shall be easily removed thru the top cover without removing the main valve from the line.

f. The complete valve shall withstand 500 psi test. It shall be equipped with an inlet and blow off valve, quick disconnect coupling and a 30' hose for flushing.

g. The sewage/air vacuum valve shall be equal to the APCO Series 401 Sewage Air Vacuum Valve.

7. Valve and Pipe Supports: Valve and pipe supports shall be equal to Clow F-1608, ITT Grinnell figure 264, or may be fabricated from cold galvanized steel.

TP - 42.03 INSTALLATION:

A. Lift station:

1. Excavate an area large enough to provide sufficient working room around the station. The outside diameter of the bottom slab shall be at least one foot larger than that of the concrete sections used. Poured-in-place bases and precast base shall be formed and placed on an 8-inch compacted gravel subbase. The concrete for poured-in-place bases shall be vibrated while it is being placed into the form. The wet well base shall be placed as a monolithic pour. For polymer concrete installations, the polymer concrete used for the base shall be from the same manufacturer of the wet well.

2. Provide connecting wet-well penetrations for the influent pipe, effluent pipe(s) and cable thrulets as shown on the drawings.

3. Excavation, trenching and backfilling shall be in accordance with Section 01 of the Technical Provisions. Backfill shall be placed in lifts not to exceed twelve (12) inches unless otherwise approved by the Owner or Owners Representative.

4. Backfill gradually and evenly around station after concrete and joints have hardened. Compact backfill to 95% compaction to minimize post-installation settlement.

5. Diameter of the top slab shall be at least 6-inches larger than O.D. of ring section. The access cover shall be installed and properly oriented in the top slab. Top slab and access cover shall be level. See lift station drawings for access cover location in relation to the centerline of the station.

6. The automatic discharge connection shall be attached to the bottom slab at the exact location required

relative to the access cover.

7. On all lift stations deeper than 15 feet, install discharge pipe brackets as shown on the plans to relieve discharge connections from overload and intermediate guide bar brackets to prevent guide bars from bending.

8. All exposed non-polymer concrete surfaces in the wet well including the walls, the top of the wet well, and the pump sump shall be covered with a wet well concrete liner/coating. The liner/coating shall be installed on the underside of the cover and on the inside face of the cover opening. The liner/coating shall be installed in accordance with manufacturer's recommendations and this section of the Technical Provisions.

B. Accessories:

1. Access Cover and Frame:

   a. The access cover and frame shall be installed on top of the concrete lift station as shown on the drawings and in accordance with manufacturer's recommendations.

   b. Grout any annular space between the access frame and concrete wet well.

   c. On top of the access cover the Contractor shall fasten a 10" x 14" x 0.60" thick fiberglass sign with embedded fade proof single stroke letters (1-1/2" height min.) on contrasting background with the following words:

      DANGER FOLLOW CONFINED ENTRY PROCEDURES BEFORE ENTERING

2. Pump Guide Bar Brackets:

   a. The guide bar brackets shall be installed in the lift station to support the guide bars as required.

   b. The guide bar brackets shall be installed in accordance with manufacturer's recommendations.

3. Pipe Brackets:

   a. The contractor shall install pipe brackets in the locations shown on the drawings or as directed by the Owner or Owner's representative. The brackets shall be constructed of Type 316 stainless steel uni-strut.

   b. The pipe shall be attached to the brackets with Type 316 stainless steel "u bolts", nuts and washers.

   c. The brackets shall be attached to the precast concrete wet well with stainless steel concrete anchors and ½" (min.) diameter stainless steel bolts and washers to provide a stable connection.

C. Submersible Pump(s):

1. The pump(s) shall be installed in strict accordance with the manufacturer's recommendations.

2. The pump(s) shall be checked for correct rotation, motor operating load, and no-load current and shall be connected to three-phase power source in the combination that results in the least unbalance in current. This check shall be performed by demonstrating a flow rate against a known head and comparing it to the pump curve. After final connections are made, the Contractor shall furnish the Owner with a copy of the voltage and current measurements and shall demonstrate the level control operation and sequence.

3. Lower submersible pump(s) into place along guide bars. Visually check metal-to-metal contact between volute flange and discharge connection. If necessary, re-check and re-align discharge connection(s) and guide bar with pump in place.

4. After proper alignment of all components, including when a metal-to-metal connection of the pump

flange is established, grout access cover, discharge connection(s) and pipe thru-lets.

5. Upon completion of the system, the Contractor shall complete and submit to the Owner a test report from the manufacturer, which contains the following information about each pump installed:

   a. pump serial numbers,

   b. performance curve numbers,

   c. motor type,

   d. voltage,

   e. base module,

   f. impeller number,

   g. test facility location,

   h. date and time, and

   i. the chief tester number.

   The test report shall also show data and a graph containing total head and input power versus flow. In addition, a copy of the completed form shall be placed in the control panel.

6. Install all accessories per the manufacturer's recommendations.

D. Davit Crane:

1. On the top slab of the wet well, the Contractor shall furnish and install the davit crane with a pedestal base for use during removal of the pumps.

2. A pedestal base for mounting the hoist to the polymer concrete slab shall be provided and cast into the lid at the location show on the drawing and per the manufacturer's recommendation.

3. The pedestal base may also be mounted to the top of the lift station by bolting the unit into the top of the concrete lift station. If bolting the unit, the Contractor shall drill holes to match the pedestal base with a minimum of 8 inches of embedment, installing concrete epoxy anchors, and bolting the unit with ¾-inch diameter stainless steel bolts, or a size recommended by the manufacturer.

4. The unit shall be mounted such that each pump may be easily extracted for service in a direct vertical manner from the lift station.

E. Concrete Valve Vault:

1. Valve vault may not be required in warmer areas where piping may be installed aboveground. Valve vault shall be required if shown on the plans.

2. The contractor shall place the concrete valve vault at the location shown on the drawings.

3. The vault shall be placed on an 8-inch thick layer of ¾-inch crushed rock or other approved material compacted to 95%.

4. All concrete and/or grout shall be placed in accordance with Section 2 of these Technical Provisions.

5. The Contractor shall install a 14-inch by 10-inch aluminum confined space sign on the top of each existing concrete valve vault cover. The sign shall be mounted to the concrete cover in a manner subject to the approval of the Owner or Owner's representative. The sign shall be equal to a model W-DA225 as manufactured by Allstate Sign & Plaque Corporation.

6. Joints between pre-cast concrete rectangular sections shall be sealed with "Ram Nek" bituminous "rope" or equal. The joints shall then be grouted to a smooth finish on the interior and exterior of the

vault. All connections between the force main and wet well walls shall be sealed with non-shrinking grout in such a manner to make the vault water tight.

F. Pipe, Fittings, and Gate Valves:

1. All pipe, fittings, and gate valves shall be installed in the locations shown on the detail drawings.
2. Pipe and fittings shall be installed in accordance with the manufacturer's recommendations and Section 43 of these Technical Provisions. No flanged ductile iron connection shall be allowed to be buried.
3. Any shop coated fittings or pipe shall be installed such that the coating is not compromised during installation.

G. Pipe Coating:

1. Outside Wet Well: All existing and proposed ferric materials for the lift station vault or above ground piping (including but not limited to: ductile iron pipe, valves, fittings, brackets, pipe supports, and beams) shall be coated to protect the materials from corrosion.
2. Inside Wet Well
   a. No ferrous material except DI pipe and fittings shall be permitted within the wet well. All nuts, bolts, clamps, struts, brackets, etc. should be specified as SS or some form of composite plastic material.
   b. All hardware within the wet well shall be 316 stainless steel. Exceptions must be approved by Owner or Owner's representative.
3. Prepare ductile iron, cast iron, or steel surfaces in accordance with the paint manufacturer's instructions and the Society for Protective Coatings (SSPC) surface preparation standard SSPC-SP2, Hand Tool Cleaning. In general, the Contractor shall ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, scale, rust, or other contaminants.
4. Paint shall be Series 66 Hi-Build Epoxoline or equal including Part A and Part B components.
5. Curing time shall be in accordance with manufacturer's instructions.
6. Hand coat primer and paint in accordance with manufacturer's instructions. Mix and/or thin paint in accordance with manufacturer's instructions. Keep container closed when not in use to avoid contamination.
7. Total dry film thickness shall equal 9.0 to 18.0 mils.
8. Colors:
   a. Tnemec Spearmint Green/Safety – 09SF for the lift station and piping
   b. Tnemec Limestone – 150GN for the control panel mounting frame and structure and the junction box enclosure.

TP - 42.04 ELECTRICAL SYSTEM:

A. General Requirements: The Contractor shall furnish all labor, equipment, design, materials and supervision required to do all the electrical and control work for the entire project as shown on the contract drawings and stated in the specifications herein and in the other sections.

1. Drawings:
   a. The contract drawings indicate the extent and the general location and arrangement of equipment, conduit, and wiring.

b. The Contractor shall study building plans and details so that the outlets and equipment will be properly located and readily accessible.

c. Because space requirements and equipment arrangement will vary according to manufacturer, the responsibility for initial access and proper fit rests with the Contractor. Final arrangement of equipment and service connections shall allow the unit to be serviced, including space to pull pumps, change fuses, and operate switches. Minimum working clearances shall be as required by NEC and local code.

d. Lighting fixtures, equipment, and outlets shall be located to avoid interference with mechanical or structural features; otherwise, lighting fixtures shall be symmetrically located.

2. Workmanship: All work shall be performed by a skilled licensed electrician and in accordance with state regulations, NEC, and the local electric company and all work necessary shall be completed in a neat and well-finished manner.

3. Codes, Standards and Permits: The Contractor must have UL or third party certification to build control panels and follow UL 508 construction standards. All work, material and equipment shall conform to the most recent edition of the following codes and standards, as applicable.

a. Applicable local codes.

b. National Electrical Code

c. National Electrical Manufacturers Association

d. Underwriters Laboratories, Inc.

e. American Standards Association

Any conflicts between these specifications or the drawings and the above will be brought to the attention of the Owner or Owner's representative for resolution prior to start of construction.

B. Design:

1. All electrical panels shall be shop-built and final field wired and tested, and shall be illustrated with complete color coded electrical drawings and instructions mounted in the panel with a copy also given to the Owner or Owner's representative.

2. All work, material and equipment inside the wet well and within five feet of the vent or access hatch shall comply with the National Electrical Code for Hazardous Locations, Class 1, Division 1.

3. The installation shall comply with applicable rules of the National Electrical Code (NFPA 70), Electrical Standard for Industrial Machinery (NFPA 79), Standard for Electrical Safety in the Workplace (NFPA 70E), and all local electrical requirements.

4. All electrical materials shall be approved by the Underwriters Laboratories.

5. All materials furnished shall be the standard products of a manufacturer regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design.

6. Replacements or repair parts shall be reasonably available in the project trade area.

7. Plans and design of the control panel(s) shall be approved by the Owner or Owner's representative prior to the construction of the panel.

8. The contractor shall provide a complete set of electrical drawings which include a power riser diagram and a line diagram based on the information in this specification and as shown on the plans.

9. Plans and design of the control panel(s) shall be approved by the Owner or Owner's representative prior to the construction of the panel.

10. The design and plans shall be stamped by a state licensed professional electrical engineer. Any proposed deviations from the functional requirements of this specification shall be noted on the schematic submittal. Approval of the schematic submittal shall not by itself change the functional requirements of this specification; the Owner or Owner's representative must specifically approve such changes in writing.
11. Submittal material containing the following items shall be submitted within thirty (30) days after award for approval by the Owner or Owner's representative or designated representative.
    a. Manufacturer's name and model number of all components of the electrical control system.
    b. Outline dimensions and general arrangement drawings of each enclosure and panel board.
    c. Electrical diagrams and schematic, stamped by a registered professional electrical engineer, showing integration of all electrical control components.
12. At the completion of construction, the Contractor must submit as-built drawings of the entire electrical system. The electrical as-built drawings shall include:
    a. General arrangement drawings of all facilities and wiring, including but not limited to, service meter and service entrance panel, each enclosure and panel board, all emergency power system components, all electrical loads including motors and pumps, lights, outlets, and control devices.
    b. Manufacturer's name and model number of all components of the electrical and control system.
    c. Electrical wiring diagrams, ladder logic diagrams, and schematics, showing integration of all electrical and control components.
        i. The wiring schematic shall be a one-line diagram with all components clearly labeled.
        ii. All wiring shall be labeled on the drawings to conform to the actual wire labeling on the system.
    d. Size and location of the conduit and the number and size of wires contained in each.

C. Electrical Service Connection, Power Supply, and Metering:

1. The Contractor shall provide a new electrical service to a new pump control panel for the proposed wastewater lift station. The minimum amperage of the new service shall be shown on the plans. The existing power supply is shown on the drawings.
2. The contractor shall coordinate the installation of the electrical service with the local power utility. The voltage shall be obtained from the local power utility. The utility line voltage shall then be reduced with a transformer by the local power utility.
3. An overhead electrical service including the external splice box, meter socket, lightning arresters, and 25-foot power pole approved by local power utility, and all necessary appurtenances required by the local power utility shall be provided from the control panel to the weather-head mounted on the 25-foot power pole installed by the contractor.
4. The tribe will contract with the local power utility to extend power to the site. However, it is the contractor's responsibility to coordinate the connection of the terminus wires at the weather-head to the primary service with the local power utility.
5. Overcurrent protection and metering shall also be installed in accordance with local power utility requirements.
6. The meter socket shall be 7 jaw. The service entrance panel shall be equal to a Milbanks Model 227MTB-48 and come complete with meter socket, main breaker (sized equal the amperage of the electrical service), and test bypass. The entrance panel shall be mounted on the building or shade

structure as shown on the drawings. The contractor is responsible for verifying that the service entrance meets local power utility requirements.

7. The local power utility will make all necessary installations at the transformer and provide the transformer and meter. All other installations shall be made by the contractor in accordance with these specifications, the drawings, and subject to the approval of the local power utility.

D. Transfer Switch: The type of transfer switch, manual or automatic, shall be identified on the plans.

1. Manual Transfer Switch:

a. The proposed lift station shall include provisions for backup power in case of utility system power outages. The backup power provisions shall include wiring and receptacle for the generator connection and a manual transfer switch to open the power circuit to the pumps when the generator is connected. This switch will make the pump control system operable in either automatic or manual modes.

b. The contractor shall provide a water tight entry point to the manual transfer switch with a large enough opening for "hard wiring" of the portable generator directly to the lugs on the main bus. The entry point shall be subject to the approval of the Owner or Owner's representative.

c. The manual transfer switch shall comply with NFPA 70 article 100, NEMA ICS 1, NFPA 70, NFPA 99, NFPA 110, and UL 1008.

d. The transfer switch shall be designed for continuous-duty repetitive transfer of full-rated current between active power sources. The switch action shall be double throw, break before make, mechanically held in both directions, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

e. The molded-case-switch components shall comply with NEMA AB 1, UL 489, and UL 869A. The components of the transfer switch shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41 category B. Components shall also meet or exceed voltage-impulse withstand test of NEMA ICS 1. All enclosures shall meet NEMA 3R/12 and comply with NEMA ICS 6 and UL 508.

f. The manual transfer switch shall be tested in all modes recommended by the manufacturer. Before energizing the equipment, the contractor shall measure the insulation resistance phase-to-phase and phase-to-ground with an insulation-resistance tester. The test voltages shall be as recommended by the manufacturer and shall meet the manufacturer's minimum resistance. The contractor shall also test for electrical continuity of circuits and for short circuits. The transfer switch shall be as manufactured by Kohler Co., Caterpillar Inc., Emerson Electric, or equal.

2. Automatic Transfer Switch:

a. The proposed lift station shall include provisions for backup power in case of utility system outages. The Automatic Transfer Switch shall be provided with ratings, number of poles/wires and installed per the electrical engineer design. The short circuit withstand ampacity shall meet or exceed the indicated AIC rating of the electrical equipment immediately connected to the load side of the transfer switch. The transfer switch shall be capable of switching all classes of loads while under full load. The transfer switch shall be provided with a NEMA 3R enclosure.

b. Load transfer of the transfer switch shall be over-center, double-throw electrically and mechanically interlocked contactors. Interlock normal and emergency contactors so that both cannot be closed at any one time. Interlocked circuit breakers are not acceptable.

c. Acceptable manufacturers shall include ASCO, Russelectric, Zenith, Kohler, or approved equal.

d. All standard door mounted switches and indicating LEDs shall be integrated into a flush-mounted,

interface membrane or equivalent in the enclosure door for easy viewing and replacement.

e. The panel shall be capable of having a manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. This cover shall be mounted with hinges and have a latch that may be padlocked. The membrane panel shall be suitable for mounting by others when furnished on open type units.

f. The automatic transfer switch shall conform to the requirements of the following codes and standards:

i. UL 1008 - Standard for Transfer Switch Equipment

ii. IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Automatic Transfer Switching Equipment

iii. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment

iv. NFPA 70 - National Electrical Code

v. NFPA 99 - Essential Electrical Systems for Health Care Facilities

vi. NFPA 110 - Emergency and Standby Power Systems

vii. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

viii. NEMA Standard ICS 10-2005, Electromechanical AC Transfer Switch Equipment

ix. EN61000-4-4 Fast Transient Immunity Severity Level 4

x. EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)

xi. IEEE 472 (ANSI C37.90A) Ring Wave Test

xii. IEC Specifications for EMI/EMC Immunity (CISPR 11, IEC 1000-4-2, IEC 1000-4-3, IEC 1000-4-4, IEC 1000-4-5, IEC 1000-4-6, IEC 1000-4-8, IEC 1000-4-11)

xiii. CSA C22.2 No. 178 certification

g. Qualifications:

i. The automatic transfer switch shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production and service of its complete product line.

ii. A manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year shall produce the automatic transfer switch.

h. Manufacturers

i. The automatic transfer switch shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The entire system shall be installed as shown on the plans, drawings, and specifications herein.

ii. The manufacture shall maintain a national service organization of employing personnel located throughout the contiguous United States. The Service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

iii. The manufacture shall maintain records of each switch, by serial number, for a minimum of 20 years.

E. Load Center: The NEMA 4X circuit breaker panel shall be adequately sized for the electrical load and

include additional circuit breakers for future use with a rating to be recommended by the Owner or Owner's representative based on the anticipated capacity of future expansion. The panel shall be furnished and installed as shown on the drawings. Circuits shall be utilized as approved on the submittals.

F. Lightning Arrestor:

1. The installation shall incorporate a Delta LA 303 or Square D J9200-98 or equal lightning arrestor connected to each line ahead of the main circuit breaker and shall be properly grounded to provide protection to all ungrounded conductors as recommended by the manufacturer. Lightning (surge) protection will be provided to each line on the load side of the master disconnect and be properly grounded.

2. The lightning arrestor shall be the silicone oxide type that will conduct the high voltage from a lightning strike to ground, but will not conduct the service voltage. The unit will reset (if still intact) after the lightning strike to continue to provide protection. The leads will be kept as straight and as short as possible. The unit will be mounted outside the load center enclosure.

3. For additional lightning and surge protection the contractor shall install fused disconnects at the existing service entry in a manner subject to the approval of the Owner or Owner's representative.

G. Fused Disconnect: A 3-pole molded case fused disconnect shall be provided as the main connecting device with an electrical meter, as required by the local utility. This disconnect shall have a NEMA interrupting rating equal to the incoming voltage and an adequately sized overcurrent protection device. The handle operator of this breaker shall have provisions for locking the "On" or "Off" positions.

H. Transformers: Any new transformer installed within the lift station shall be Square D general purpose indoor/outdoor encapsulated transformer, class 7400 (Square D Mini Power Zone), or equal. Transformer shall be installed in accordance with manufacturer's recommendations.

I. Control Panel Support Structure:

1. A control panel support structure designed to support the NEMA 3R gutter, control enclosure and other accessories shall be fabricated and installed in accordance with the details.

2. The control panel structure shall be constructed of a steel frame and/or unistrut channels attached to two 3-inch diameter schedule 40 galvanized steel posts as shown on the plans. The posts shall be set in 15-inch diameter by 36-inch deep minimum, concrete footings.

3. It shall have a galvanized shade structure approximately 7' feet long to provide adequate shade and also shall be equipped with a full cutoff wall mounted luminaire with a fully gasketed two-piece die-cast aluminum housing finished with a bronze polyester powder coat. EPDM gasketed sealed impact-resistance glass lens UL approved for wet locations. Luminaire to include a photocell. It shall meet the McGraw-Edison (IST-B02-LED-E1-BL3-BZ-P) or equal.

4. Any portions of the structure that are not galvanized construction shall be painted with an appropriate primer and an epoxy enamel finish meeting the ferric coating requirements provided in this section of the Technical Provisions.

J. Enclosures:

1. Enclosures shall be NEMA rated as shown on the drawings. The control panel shall be NEMA 4X, and the control panel structure gutter shall be NEMA 3R.

2. Access to the enclosure shall be required from only the front side. Outline dimension and general arrangement drawings of the enclosure shall be included with the approval prints.

3. Differing voltage control circuits shall be physically separated from each other. This shall be accomplished by two enclosures or a double door enclosure with swing out doors and panel dividers.

4. The circuit breakers, lighting panel breakers, and HOA switches shall be operable through the door of the enclosure without opening the door. Access to the enclosure shall be required from only the front side. Outline dimension and general arrangement drawings of the enclosure shall be included with the approval prints.

K. Alarm Light:

1. An alarm light to signal alarm conditions shall be mounted at the location shown on the plans or designated by the Owner or Owner's representative. The alarm light shall be a caged incandescent fixture with red glass globe, designed for exterior installation. A 100-watt rough service bulb shall be installed in the fixture.

2. An alarm light test switch shall be installed on the pump control panel. This switch shall be installed so that when turned on, the alarm light shall be energized for a period of not less than 10 seconds to check if the bulb is functioning correctly and then turn off automatically.

L. Panel Temperature Control:

1. If required on the plans, new electrical panel installation shall include a thermostatically controlled heating unit capable of preventing the panel and all components within the panel from freeze damage and to maintain their functionality to a temperature of -10°F.

2. New electrical panel installations in hot weather locations shall include a thermostatically controlled venting unit capable of preventing the panel and all components within the panel from overheating.

M. Trouble Light:

1. The contractor shall install a trouble light equal to a Lithonia Model DM240-120 ES over the control panel to provide light when working on the panel.

   a. The trouble light shall be suitable for damp locations and shall be mounted to the control panel roof structure using stainless steel hardware.

   b. The trouble light shall be equipped with T-8 fluorescent light bulbs.

2. The contractor shall also install a switch as shown on the drawings to turn the light on and off.

N. HOA Switch:

A heavy-duty, three-position, hand-off-auto selector switch shall be mounted on the control enclosure for the operation of each branch circuit.

1. This selector switch shall operate the starter when it is in either the "Hand" position or the "Automatic" position and the automatic control system is calling for the operation of the equipment in the manner, as herein described.

2. The manual (Hand) mode shall override all safety devices except the thermal overload and shall engage each branch circuit until turned off.

O. Motor Starter:

The type of starter, combination or soft start, shall be identified on the plans.

1. Combination Motor Starter:

   a. Each pump circuit shall be equipped with a fixed-mounted, combination magnetic motor starter manufactured in accordance with the latest published NEMA standards and sized in accordance with the motor manufacturer's specific recommendations. The combination magnetic motor starter shall consist of a motor circuit protector and motor starter with thermal overload units. Thermal overload units shall be bi-metal or electronic relays of one piece construction and shall be interchangeable. Thermal overload units shall have door mounted resets and be sized in

accordance with the motor manufacturer's specific recommendations.

b. The disconnect handle used on the combination motor starter shall always be in control of the disconnect device with the door open or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF".

c. The pump circuit shall be equipped with a motor circuit protection device specifically designed for fast tripping on low-fault currents and capable of protecting the motor, the motor circuit, and the starter equipment from extensive fault damage according to the limits of the setting of the breaker. The unit shall be capable of tripping in 0.05 seconds or less at the fault currents for which it is set. The settings shall be made by the Contractor in accordance with the motor manufacturer's specific recommendations.

2. Electronic Soft Start Controller:

a. Each pump circuit shall be equipped with a fixed-mounted, electronic soft start controller, with bypass contactors to handle the full pump load after soft start. The soft starter shall also provide for slow stopping.

b. The electronic soft starter shall be a Cutler-Hammer solid state starter S811 with pump control feature. Substitutions must be approved by the Owner or Owner's representative, prior to building the pump control panel.

c. A disconnect handle shall be installed and shall always be in control of the pump panel disconnect device, with the door open or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF."

d. The pump circuit shall be equipped with motor circuit protection specifically designed for fast tripping on low-fault currents and capable of protecting the motor, the motor circuit, and the starter equipment from extensive fault damage according to the limits of the setting of the breaker. The unit shall be capable of tripping in 0.05 seconds or less at the fault currents for which it is set. The settings shall be made by the Contractor in accordance with the motor manufacturer's specific recommendations.

e. The Contractor shall program the soft starters and motor protection devices with the appropriate motor protection settings based upon pump manufacturer recommendations and actual incoming voltage. Contractor shall record the programmed settings and attach them to the inside of the pump control panel door. The Contractor shall also train the local Utility Authority how to adjust the settings.

P. Voltage Monitor: A power monitor with adjustable reset delay shall be included in the system. The monitor shall be capable of protecting the motors against loss of any phase, low voltage on any or all phases, and phase reversal. The monitor shall have an adjustable reset delay time of 20 to 300 seconds. The power monitor shall utilize a solid state sensing circuit and shall be equal to Time Mark Model 265 or Diversified SLD-230-ALE with appropriate voltage rating.

Q. Motor Protectors:

1. The Contractor shall install programmable electronic motor protectors for each pump. Motor protectors shall be Motorsaver Model 777 (3 phase) or 77C (single phase) or approved equal. The motor protectors shall be installed in accordance with manufacturer's recommendations.

2. This device shall monitor the power circuit for the pumps prior to the control circuit. The unit shall de-energize the control circuits when a phase loss, phase reversal, or low voltage condition occurs. The unit shall be solid state and shall have an adjustable trip delay of 0.2 to 20 seconds. The unit shall automatically reset when the failure is corrected, with adjustable reset delays. The device shall be mounted within the pump motor control enclosure with an indicator on the enclosure door when

the protection device has been activated. The device shall be electronically interfaced with the pump control system, which is to alarm when the device is tripped.

R. Relays: General purpose relays shall be electromagnetic type with double-pole double-throw contacts. Relays shall be socket mounted. Timing relays shall be adjustable, 0-5 minutes, timing starts when coil is energized.

S. Alternator: Provision shall be made for the two pumps in the system to be automatically alternated by an alternator on successive starts. A three position selector switch placing the two pumps in a 1-2 only sequence, a 2-1 only sequence or automatic alternation operation shall also be incorporated and mounted on the interior panel cover. The alternator shall be a two circuit Autocon Model 7101 or Diversified ARB-120-ACA or approved equal.

T. Run-Time Meter: A non-resettable running time meter measuring minutes of operation up to six digits shall be furnished for each pump motor. This shall be an AC device operating from the control voltage by an auxiliary contact of the motor starter and shall be mounted inside the enclosure on the interior panel cover.

U. Pump Counter: A six digit non-resettable counter shall be installed on the control panel for each pump to count the number of times that each pump is energized. The pump counter shall be equal to a Redington Model 48 electromechanical totalizer.

V. Pilot Lights: One outer-door-mounted, push-to-test, oil-tight green light shall be provided for the pump on the pump control enclosure to indicate operation of the pump. A red pilot light of the same type shall be provided for pump fail conditions.

W. Receptacles:

1. Receptacles shall be provided and installed where shown on the drawings.
2. Receptacles shall be specification grade duplex, 20 amp, l25 volt, two-pole, three wire, grounded type, NEMA configuration 5-2OR.
3. The receptacles shall be back and side wired with screw terminals over pressure plates suitable for #12 AWG Stranded wire and equal to Leviton or Hubbell 5362 or 5362-I. Receptacles will be mounted in a surface junction box with metal snap cover plate equal to Bell 3270-L and 3245-AL.
4. The receptacles will be connected to a 20 amp, l pole GFI circuit breaker with two wires plus ground.
5. The un-grounded (hot) conductor connected to the smaller of the two parallel slots will be black; the neutral return to the GFI white or gray; and the ground wire green. All wire will be stranded #l2 AWG THWN.
6. Exterior receptacles shall be equipped with plastic single gang toggle switch with plastic cover for weatherproofing equal to a McMaster-Carr item #: 70025K78.

X. Receptacle, Switch, & Junction Boxes: Boxes, including covers, shall be designed and installed in accordance with NEC requirements. Boxes shall be firmly attached to the structure using stainless steel expansion anchors, bolts, washers, nuts, and/or screws as applicable drilled through the back of the box.

Y. Lift Station Junction Box:

1. The contractor shall install a junction box a minimum of 36” away from any wet well opening. The junction box shall allow for easy removal of the pumps by disconnection of the pump cable at the terminal blocks in the junction box.
2. The junction box shall be a 20” x 20” x8” NEMA 4X Stainless Steel junction box with hinged door and power distribution blocks for cable terminations. The junction box shall be mounted on two double-sided-P-1000 SS Unistruts with a 2’ deep x 12” diameter concrete foundation as required to

properly support equipment.

3. The junction box shall be a minimum of 36” above ground. A seal off equal to RectorSeal Duct Seal Compound shall be installed at the entrance to the lift station junction box, no more than 6-inches from the enclosure, to restrict the passage of gases or vapors from the lift station to the control panel.

Z. Branch Circuit Breakers:

1. All branch circuits shall be GFI protected. GFI circuit breakers will be equal to Square D "QWICK-GARD" QO GFI (10,000 AIC).

2. Each circuit breaker will be clearly identified to indicate the circuit it protects.

AA. Nameplates: All major components and sub-assemblies shall be identified by function with laminated, engraved Bakelite nameplates or similar approved means.

BB. Wiring and Wiring Methods:

1. All wire on the load side of the meter shall be stranded copper. Wiring between or outside enclosures will be in conduit or wireway. The ground wire to the ground rod at the service entrance may be exposed.

2. All wiring shall be suitable for wet or dry locations and shall have not less than 600 volt, 90 degree Celsius thermo-plastic insulation and all power wiring shall be in complete conformity with the National, State and Local Electric Code and NEMA Electrical standards.

3. Conductors in contact with the earth shall be UF or USE 600 volt intended for direct burial. The ampacity of the wires shall be determined in accordance with NEC Article 310 (Conductors for General Wiring).

4. The 90^{o}C column shall be used unless the terminals on both ends of the wire are marked for a higher temperature, in which case the higher temperature column may be used.

5. Unless otherwise indicated or required the insulation of ungrounded (hot) conductor(s) will be black; the neutral will be white or neutral gray; and the ground will be green. All wiring shall be color and number coded.

6. Branch circuit conductors shall not be smaller than No. 16 AWG. Wiring within panels and boxes shall be installed neatly without the use of excessive amounts of wire. Where circuits and terminals are provided for connection of wires by others, space and a clear patch within the panel or box shall be provided by the control manufacturer to allow the installation of these wires without disturbance of the control wiring.

7. Wire splices are allowed only in junction boxes, wire ways, or conduit fittings and shall be KILLARK "O" series or approved equal. Couplings, pulling elbows and connectors are not fittings for this purpose. Splices may be made with wire nuts, split bolt connectors or terminal blocks. Crimped butt splices may be used on stranded wire. Wire putty will be used where necessary to cushion sharp edges prior to wrapping the splice with plastic electrical tape.

CC. Conduit and Wireways: Wherever possible, wiring shall be installed in walls and ceilings in accordance with NEC. If wiring must be exposed, it shall be installed in locations such that it does not impede pedestrian walkways or general access and egress as directed by the Owner or Owner’s representative.

1. Steel wireway may be used in dry locations. They will be constructed, sized and installed in accordance with NEC Article 362 (Wireways). Connections between the wireway and other components will be as recommended by the manufacturer.

2. Electrical metallic tubing (EMT) may be used in normally dry locations. Installation will be in accordance with NEC Article 348 (Electrical Metallic Tubing). Couplings, connectors and adapters

will be compression type. Set screw or crimped type shall not be used.

3. Rigid conduit will be used in wet locations, in concrete, or in contact with the earth. Conduit in direct contact with the earth shall be non-metallic (PVC) conforming to NEC Article 347 (Rigid Metal Conduit). Conduit that passes through walls or that may be subject to rough use shall be rigid metallic conduit conforming to NEC Article 346 (Rigid Metal Conduit).

4. Conduit exposed to direct sunlight shall be metal conforming the NEC Article 348 or NEC Article 346. The transition between metallic and buried non-metallic conduit shall be at the finish ground line using threaded plastic adapters. The joints of rigid non-metallic (PVC) conduit shall be glued together.

5. Flexible metal conduit may be used where installation conditions warrant its use. Flexible metal conduit will have an outer liquid tight non-metallic, sunlight resistant flexible covering conforming to NEC Article 35l.

6. Connectors will incorporate a threaded metal insert, sealing ring and compression nut equal to Ideal VAP-OIL-TITE 75 series. Flexible conduit runs will be limited to six feet or less.

7. Wireways and exposed conduit will be run parallel to floors and walls.

8. Minimum conduit size will be in accordance with Tables l, 3A, 3B, 3C of NEC, Chapter 9. No more than 40% of the cross section of the conduit shall be filled.

9. Conduit bends will be constant radius without wrinkles, made with an appropriate sized bending tool and no conduit shall be crushed or deformed. The total of the bends in a conduit run between junction boxes or pulling elbows shall be less than 360 degrees.

10. Metallic conduit will be supported at least every l0 feet and within 3 feet of an outlet box, junction box, cabinet or fitting. Support for non-metallic conduit will be at least every three feet for one inch and smaller and every five feet for conduit larger than one inch. Support will be one or two hole straps manufactured for the type and size conduit to be supported. Straps will be fastened to masonry with expansion anchors.

11. Conduit shall be cut with a saw. The use of a wheel type tubing cutter is prohibited. The cut ends of the conduit shall be reamed or filed to remove sharp edges and burrs. Water pipe or nipples will not be used unless the cut ends are reamed or filed to remove all burrs or sharp edges.

12. Rigid conduit will be fastened to the enclosure using conduit hubs such as MYERS SCRU-TITE. EMT will be fastened to enclosures using a compression EMT connector and a conduit hub. Fastening with a locknut alone is not acceptable.

13. Conductors will be protected at conduit ends, nipples or connections by plastic insulating bushings or insulated throats unless the fitting provides equivalent protection.

14. In no case shall this conduit be used for grounding.

DD. Wiring Diagram and Manuals:

1. The contractor shall furnish four (4) copies of the Manual of Operation including connection and internal wiring diagrams, operation instructions, renewal parts lists, etc.

2. The manual of operation shall contain illustrations of each element of the panel, an explanation of the operation of each element, an explanation of the operation of the complete control system with each element fully integrated, an outline of trouble shooting methods for repairs, and a routine checklist of all maintenance that must be performed on the control system. One of the four (4) booklets shall be bounded with a plastic cover and securely attached to the inside of the control panel door.

3. Specifically the manual shall have as a minimum the following:

a. Index or table of contents

b. Description of operation

c. Illustration and explanation of all building electrical components.

d. As-constructed wiring diagram showing the integration of the different elements of the control system which can also be used as a reference when following the explanation of the sequence of operation.

e. A short discussion of what to look for while following the routine maintenance check list.

f. A list of tests that should be conducted on the panel including how to detect normal or abnormal operation of the separate elements of the control panel. The trouble shooting guide shall also indicate which repairs can normally be done by an operator and which should be done by a competent electrician. The name, address, and telephone number of the nearest factory representative shall be included.

g. A wiring diagram of the entire control panel shall be laminated with clear plastic and attached to the inside of the control panel door. It shall be integrated with the ladder diagram. The wiring diagram shall show the color codes of all wiring.

EE. Equipment Grounding System: All conductive materials enclosing electrical conductors or equipment shall be connected to form the equipment grounding system. The fault current path shall be permanent, electrically continuous, and shall be capable of safely carrying the maximum fault likely to be imposed on it, and shall have sufficiently low impedance to facilitate the operation of overcurrent devices under fault conditions. The equipment grounding system must be sized so that the fault current flows without causing dangerous overheating in accordance with Article 250 of the National Electric Code.

FF. Grounding Electrode System:

1. If available on the premises at each building or structure served, underground metal water pipes, metal frames of buildings or structures, steel reinforcing bars (in concrete), grounding rings, and other manufactured or existing electrodes shall be bonded together to form the grounding electrode system (a.k.a. UFER grounding system).

2. The electrical system shall contain a neutral to ground bond or "bonding jumper" designed in accordance with Section 250-66, installed in accordance with Section 250-64 (a) and (b), and connected in accordance with Section 250-70 of the National Electric Code.

3. An unspliced grounding electrode conductor shall be installed from the neutral to ground bus to any convenient grounding electrode available in the grounding electrode system or to one or more grounding electrode(s) individually.

4. It shall be sized for the largest grounding electrode conductor required among all the electrodes connected to it in accordance with the National Electric Code.

5. The grounding electrode system shall be tested for earth ground resistance. Resistance shall be less than 25 ohms for most applications.

6. All grounding systems, including the lightning arrestor ground, shall be connected together.

GG. Control Panel Testing: The Contractor shall have each control panel installed under this contract tested by a nationally recognized testing laboratory in accordance with UL508A prior to installing the panels. The Contractor shall submit a copy of the testing report for each panel to the Owner or Owner's representative.

TP - 42.05 PUMP CONTROL SYSTEM:

A. Control Panel: The control panel/enclosure shall be by EG Controls, Inc. or equal as required to accommodate the features and requirements defined below.

1. NEMA 4X, 304 stainless steel enclosure with solid, removable back panel, lockable dead-front hinged cover fabricated from 0.08 marine alloy aluminum.
2. HOA selector switch and green light for each pump mounted on the enclosure sub-panel; alarm silence push button.
3. Six-digit, non-resettable elapsed time meter for each pump motor with visible display mounted on the inside of the control panel.
4. Six-digit, non-resettable pump start counter for each pump motor, with visible display mounted on the inside of the control panel.
5. Electronic soft starters or combination NEMA rated motor starters.
6. Short circuit-rated E-frame thermal magnetic circuit breakers with thermal overload elements sized for the pumps being installed and external reset buttons mounted on hinged dead front.
7. Motorsaver Model 777 (3 phase) or 77C (single phase) or approved equal overload relays for each pump
8. Solid state alternating selector to balance pump wear, run-times, starts and stops.
9. Control circuit transformer with primary and secondary circuit breakers and individual circuit breakers for 120 VAC loads.
10. Rotating NEMA 4X red Lexan flashing beacon alarm light and a low level (50 dB) audible pulsed tone horn to annunciate any alarm condition.
11. Pump on/off levels and high alarm levels set by wiring to terminal connections on the sub-panel face, which corresponds to the pump level settings.
12. Automatic shutdown of pumps upon motor high temperature condition with auto reset upon cool down and manual memory alarm light reset.
13. Automatic shutdown of pumps upon liquid entry into pump motor stator housing.
14. Lightning/surge arrestor that complies with ANSI C62.11; Intermatic model AG 6503 or equal as recommended by the control panel manufacturer.
15. Lag pump time delay that prevents both pumps from starting at the same time.
16. 20 Amp GFI duplex receptacle.
17. Control panel heater and/or fan with thermostat to maintain operating temperature for all control panel components.
18. Wet well float level control system.
19. Component and device labels and terminal numbering system to correspond with the supplied schematic and wiring diagrams.
20. All level control wiring shall be specially labeled to indicate function.
21. The control panel shall include dry contacts for Pump 1 and 2 overload, pump 1 and 2 over temperature, pump 1 and 2 moisture, wet well high level control, power failure, and pump called for but not run indicator.
22. Furnished with other accessories and components as shown on the drawings, complete with schematics, connection diagrams, and sequence of operations.

23. A 2-year warranty shall be provided for the pump control panel and the level control system.

24. Front panel mounted selectable amp and voltage meters for the motor leads (L1,L2,L3)

B. Liquid Level Sensing:

1. The Contractor shall furnish and install a float-style level control system. The control system shall consist of four floats, 2 basic relays, and a relay with an alarm.

2. The floats shall signal the all pumps off, lead pump on, lag pump on, and high alarm levels at the elevations shown on the drawings. The floats will signal the 2 pumps to start/stop via the 2 basic relays, and will signal the alarm via the relay with alarm.

3. The wiring between the floats and the relays shall be as recommended by the manufacturer.

4. The level sensors shall be Flygt or approved equal and shall be corrosion resistant polypropylene sphere floats which contain a mechanical micro-switch in a plastic casing. The switch shall be flexibly supported by means of a heavily neoprene jacketed three (3) conductor cable.

5. These level sensors shall be supported by a stainless steel bracket at elevations in the wet well as shown on the drawings or as directed by the Owner or Owner's representative and shall be installed in accordance with the manufacturer's recommendation.

C. Alarms and Pump Shutdown:

The submersible wastewater pumps shall operate on an automatic lead/lag alternating sequence. There are three possible operating conditions as follows: Lead Pump On, Lag Pump On, and All Pumps Off. Each individual pump shall automatically shut down if one of the following occurs:

1. Low wet well level

2. Liquid entry into the pump motor stator chamber

3. Motor starter thermal overload

4. Over-voltage

5. Under-voltage

6. Incoming line power phase loss

7. Incoming line power phase reversal

The alarm activation conditions shall include high wet well level or any of the previously-stated automatic shutdown conditions. Any of these conditions will activate a strobe light external to the control panel.

TP - 42.06 OPERATION AND MAINTENANCE MANUALS:

A. Submit two (2) sets of preliminary O and M Manuals for Owner's review at least seven (7) calendar days prior to final inspection and/or startup of any equipment system furnished under this Contract. O and M Manuals shall be bound in 8-1/2 x 11 inch three D-size ring capacity expansion binders with hard durable plastic covers. All sheets shall have reinforced binding. All documents to be originals, unless otherwise noted.

B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, date, Owner, contract number and subject matter of binder when multiple binders are required. Printing shall be on face and spine.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly typed under reinforced laminated plastic tabs.

D. Contents:

1. Table of Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 30 pound white paper.
2. Part 1**:** Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
3. Part 2**:** Operation and maintenance (O&M) instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following.
    a. Significant design criteria.
    b. List of equipment including model and serial number.
    c. Parts list for each component.
    d. Operation instructions.
    e. Scheduled maintenance instructions for equipment and systems including lubrication instructions.
    f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
    g. At the front of this Part, indicate a convenient operation summary including preventative maintenance and a trouble shooting guide. The summary should list the tasks that are required on a daily, weekly, monthly and annual basis.
4. Part 3: Project documents and certificates, including the following.
    a. Shop drawing and product data to reflect as-built condition. Edit the documents to show only the information applicable to the Project.
    b. Certificates.
    c. Photocopies of warranties and bonds.
5. The Owner or Owner's representative will return one (1) copy of the preliminary O & M manual with Owner or Owner's representative's review comments/requirements.
6. Content of the O & M Manuals shall be revised as required prior to final submittal.

E. Submit four (4) copies of the final O & M manuals that reflect all corrections pursuant to Owner or Owner's representative review comments within seven (7) calendar days after receipt of Owner or Owner's representative review comments on the preliminary O & M manuals.

TP - 42.07 MANUFACTURER'S REPRESENTATION:

A. The contractor shall schedule the material or product suppliers or manufacturers for the pump and electrical control systems to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions and training of Owner's personnel when necessary. The date of start-up and training shall be approved by the Owner or Owner's representative or designated representative.

B. Contractor to report to Owner material or product supplier's or manufacturer's observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

C. Submit report in duplicate within 14 days of observation to Owner and Owner's representative for review.

TP - 42.08 START-UP:

The contractor shall furnish trained personnel, equipment and supplies as needed for startup of the lift station.

A. Conduct for a period of 4 hours:

1. Demonstration that all major process, maintenance, operations, and monitoring equipment are fully functional before and throughout the entire scheduled period.
2. Once startup operations begin, continue operations until scheduled period of successful operation is achieved.
3. If equipment fails (as determined by Owner or Owner's Representative) during start up, re-start start up procedure once problem(s) is/are corrected.

B. Contractor Responsibilities:

1. Maintain, monitor, and adjust all new equipment and facilities.
2. Notify Owner or Owner's representative in writing 7 calendar days prior to start up.
3. Include startup operation in contract time.
4. With notice of startup, include proposed written schedule of all field instruction specified for review by Engineer and Owner. Schedule all instruction to facilitate Owner's and Engineer's participation. Revise proposed schedule as required to accomplish this objective.
5. Where practical for the equipment or system involved, instructions should be communicated and enacted prior to start up; all other instructions are to occur prior to completing startup operations unless specifically approved in writing by Owner or Owner's representative.
6. Provide electricity and water required for startup.

C. Owner Responsibilities: The owner shall operate the lift station facility constructed under this contract with guidance from the Contractor and manufacturer's representatives (i.e. Training staff).

D. Lift Station Start Up Schedule:

1. Test to be conducted on Contractor-furnished water, permanent electrical service connection, and Contractor-furnished portable generator.
2. Pump start up consists of successful cycling of pumps and controls over a 24-hour period.
3. Re-start the startup sequence if pump on-off cycling is not smooth or steady operation of the pumps cannot be achieved.
4. Simulate high and low alarm conditions to show correct operation of alarm modes.

TP - 42.09 TRAINING:

A. The Contractor shall provide the wastewater system operator(s) with four (4) hours minimum of training and instructions directly from the manufacturer's representative on the system operation, preventative maintenance, troubleshooting, repair, and use of the equipment.

B. In the presence of the Project Engineer during the contract final inspection, the Contractor shall provide instructions on the system operation and provide copies of the approved final electrical submittals and as-built drawings as required.

C. The Contractor shall provide for an additional four (4) hours minimum of training and instructions directly from the manufacturer's representative on the system operation, preventative maintenance, troubleshooting, repair, and use of the equipment at or within 90 days of the one year anniversary of the startup per the discretion of the utility and the availability of the manufacturer's representative.

D. Any payments for the additional training shall be completed by the Contractor by the time of the final payment and evidenced by a signed correspondence from the manufacturer's representative agreeing to carry out said training at or within 90 days of the one year anniversary upon written request from and at no charge to the Owner.

TP - 42.10 SPARE PARTS:

The Contractor shall develop and maintain a master list of all spare parts and maintenance materials to be furnished under this Contract. The Contractor shall organize the master list according to Division number and Specification Section number and shall update the master list to reflect any impacts by authorized Changes to the Work. The Contractor shall also provide products, spare parts, maintenance and extra materials in quantities specified below along with a copy of the master list described above. All items shall be produced by the same manufacturer as that who furnished the specified Products and shall be compatible with the installed Products.

A. Spare Pump Parts Required: The Contractor shall deliver the spare parts to the project site or to the location directed by the Owner or Owner's representative; and obtain receipt from Owner or Owner's representative prior to final payment.

Two (2) pump rebuild kits consisting of seals, bearings, O rings, and a wear ring for the lift station.

B. Spare Electrical Parts:

The Contractor shall supply the owner with the following spare electrical parts:

1. Three (3) fuses for each type of fuse installed in each panel.
2. Three (3) relays for each type installed in each panel.
3. Two (2) light bulbs for each light bulb installed.

C. Confined Space Equipment:

If required by the plans, the Contractor shall supply the Owner with the following safety equipment:

1. One (1) four-gas detector for confined spaces. The four-gas detector shall be able to detect oxygen 0-30% by volume), combustible (LEL, 0-100%), carbon monoxide (0-500 ppm), and hydrogen sulfide (0-100 ppm). The four-gas detector shall be equipped with a 95 dB audible alarm and a flashing red LED visual alarm light. The detector shall have a battery life of 10 to 12 hours.
2. One (1) blower for confined spaces. The blower shall be an axial blower with 115 VAC, 1/3 HP, 3 amps, single speed, 1275 cfm free flow ventilation capacity, 8-inch diameter 25-foot long flexible duct with storage canister.

TP - 42.11 ABANDONMENT OF EXISTING LIFT STATION:

After successful start-up of the new lift station as described in this specification, the contractor shall abandon the existing lift station, if shown on the plans. All surface features shall be removed. The yard hydrant, sewage pumps, and existing lifting hoist shall be delivered to the Owner. All other equipment including the control panel shall be disposed of by the contractor in an approved landfill. After removal of all surface features and pumps, the contractor shall pump out any remaining wastewater, crush the top of the existing wet well and valve vault, and fill the wet well and valve vault with native soils.

TP - 42.12 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT:

A. Lift Station: Payment is for the lump sum bid price for a complete wastewater lift station including labor, equipment, delivery, testing, site access, clearing, excavation, backfilling and compaction, dewatering, piping, wet well, wet well liner, wet well lid and access cover, confined space entry sign, installation of drain line from valve vault to wet well, lift station accessories, davit crane, concrete valve vault contents,

force main piping, valves, flow meter, submersible pump(s), as-builts, operation and maintenance manuals, training, abandonment of existing lift station, delivery of items removed or abandoned to the Owner, and site cleanup and all necessary appurtenances for a complete and operational installation. Payment shall also include any of the following optional items required by the plans: mix-flush system, concrete valve vault, confined space entry blower, four-gas detector, and abandonment of existing lift station.

B. Lift Station Electrical: Payment is for the lump sum bid price for a complete wastewater lift station electrical system including labor, equipment, delivery, testing, electrical design and as-builts, control panel, manual transfer switch, wet well level control, junction box, electrical work, electrical design stamped by professional electrical engineer, electrical service connection, control panel structure, enclosures, outlets, 25-foot power pole, wiring and conduit from control panel to wet well for pump power and level control cables, all associated power utility costs, wiring diagrams, coordination of electrical service installation with PNM, and all necessary appurtenances for a complete and operational installation.

SEWAGE LIFT STATION INSTALLATION

PUMP INFORMATION FORM

Reservation: _____ Community: _____

Contract #: _____ Contractor: _____

Lift Station Name: _____

Date of Installation: _____

Pump Type: Submersible: _____ Centrifugal: _____

Float Switch Manufacturer: _____

Normally Open: _____ Normally Closed: _____

PUMP NO. 1:

Pump Manufacturer: _____

Model: _____ Serial No: _____

Motor Manufacturer: _____ Serial No: _____

Horsepower: _____ _____Volts _____-Phase _____RPM

AMPERAGE: Red: _____Amp; Black: _____Amp; Yellow:_____Amp

VOLTAGE: Red to Black: _____V; Red to Yellow: _____V; Yellow to Black: _____V

RESISTANCE: Red to Black: _____ohm; Red to Yellow: _____ohm; Yellow to Black: _____ohm

PUMP NO. 2:

Pump Manufacturer: _____

Model: _____ Serial No: _____

Motor Manufacturer: _____ Serial No: _____

Horsepower: _____ _____Volts _____-Phase _____RPM

AMPERAGE: Red: _____Amp; Black: _____Amp; Yellow:_____Amp

VOLTAGE: Red to Black: _____V; Red to Yellow: _____V; Yellow to Black: _____V

RESISTANCE: Red to Black: _____ohm; Red to Yellow: _____ohm; Yellow to Black: _____ohm

COATING / LINING PERFORMANCE HISTORY

PROJECT NO: _____

INFORMATION REQUIRED FROM LOW BIDDER (MUST BE COMPLETED AND SUBMITTED AFTER THE BID OPENING). PERFORMANCE HISTORY FOR THE APPLICATION OF THE SPECIFIED OR SIMILAR COATING / LINING FOR THE PREVIOUS THREE (3) YEARS

Contractor Name: _____

Project: _____

Date: _____

Locations: _____

Client: _____ Client Phone: _____

Material Applied: _____

Failures: _____

Contractor Name: _____

Project: _____

Date: _____

Locations: _____

Client: _____ Client Phone: _____

Material Applied: _____

Failures: _____

Contractor Name: _____

Project: _____

Date: _____

Locations: _____

Client: _____ Client Phone: _____

Material Applied: _____

Failures: _____

SUBMITTAL REVIEW FORM

SECTION 42 – SEWAGE LIFT STATION

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
42.02	Wet well and Appurtenances		
42.02	Wet Well Liner		
42.02	Coating Certification and References		
42.02	Wet Well Fittings and Accessories		
42.02	Cover & Frame		
42.02	Submersible Pumps and accessories		
42.02	Davit Crane		
42.02	Concrete Valve Vault and Contents		
42.02	Pipe, Fittings, and Gate Valves		
42.04	Electrical wiring, control panels, and electrical components		
42.04	Electrical design stamped by a state licensed professional engineer		
42.04	Generator Receptacle and Transfer Switch		

42.05	Pump Control System Components		
42.06	O&M Manual		
42.10	Spare Parts		
42.10	Confined Space Entry Four-Gas Detector		
42.10	Confined Space Entry Blower		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 43 - SEWER FORCE MAIN

TP - 43.01 SCOPE:

The work covered by this section consists of furnishing all equipment, labor, materials, and incidentals necessary for the complete installation of the sewer force mains and appurtenances, in strict accordance with applicable drawings and these specifications.

TP - 43.02 GENERAL:

The sewer force main shall be constructed in the locations to the grades and of the sizes shown on the drawings, or as directed by the Owner or Owner's Representative. Excavation, trenching and backfilling shall be in accordance with Section 01 of the Technical Provisions. Staking, utility locates and existing system abandonment shall be conducted in accordance with Section 01 of these Technical Provisions.

Pipe joints, fitting and appurtenance installation shall be in accordance with the manufacturer's recommendations. All pipes and joints shall be approved by the Owner or Owner's Representative prior to backfilling. The work will not be accepted until satisfactory backfilling, compaction, testing and cleanup is complete. Final grading should prevent surface water runoff from pooling around installed facilities. If the work does not meet the specified requirements of this Section, the Contractor shall remove and replace and re-test, as necessary, at the Contractor's expense. The Contractor shall leave each premise in a neat and orderly condition, restoring it as near as possible to its original condition and to the approval of the Owner or Owners' Representative

TP - 43.03 MATERIALS:

Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.

The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Handle pipe with padding between metal machinery and pipe. Keep dirt and foreign material away from pipe interiors and sealing surfaces. Lower pipe carefully into the trench without dropping, rolling or dumping the pipe

A. General: Inspect all materials prior to installation to ensure that they are in new condition. Ensure that pipe, fittings and materials are free from defects and damage at the time of delivery and prior to installation in the trench. Plastic pipe with scratches, gouges, or grooves deeper than 10% of the wall thickness or ultraviolet discoloration shall be rejected. Remove all materials from site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications within 24-hours of discovery.

B. Pipe: Required pipe material is identified in the Bid Schedule, plans and details.

1. PVC Pipe:

a) PVC Pipe (2-inch): PVC pipe shall be SDR 21 (200 psi). Pipe shall conform to ASTM D-2241 and ASTM D-1784. Fittings shall be 2-inch SDR-21 gasketed fittings with the PVC material conforming to ASTM D-1784, joints conforming to ASTM D-3139, and gaskets conforming to ASTM F-477.

b) PVC Pipe (4 to 12-inches): PVC pipe and joints shall conform to the requirements of ANSI/AWWA C900 or C909, DR18 Class 235 (minimum), Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch, DR18 Class 235 with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139 or as otherwise defined on the Bid Schedule.

c) PVC Pipe (14-inch and larger): All 14-inch and larger PVC pipe shall conform to the

requirements of AWWA C905 with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139.

2. Ductile Iron Pipe: All ductile iron pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51 for centrifugally cast ductile iron pipe. Pipe shall be manufactured in accordance with ANSI/AWWA C111/A21.11 for rubber gasket joints and ANSI/AWWA C115 for flanged joints for ductile iron pressure pipe and fittings.

   Pipe thickness shall meet the requirements of ANSI/AWWA C150/A21.50 for thickness design of ductile iron pipe. Pipe shall be cement mortar lined and seal coated meeting the requirements of ANSI/AWWA C104/A21.4 for cement mortar lining for ductile iron pipe and fittings for water. Pipe shall have push-on joints, unless otherwise indicated on the plans or in the bid schedule.

3. High Density Polyethylene Pipe (HDPE): All HDPE used in constructing the sewer force main shall conform to Section 28 of the Technical Provisions.

C. Ductile Iron Fittings: Ductile iron fittings shall meet ASTM A536, 350 psi pressure rating for 2" to 24" diameter fittings in accordance with ANSI/AWWA C153/A21.53. Fittings shall meet ANSI/AWWA C153/A21 with the maximum deflection of 8° for 2" to 4" fittings, 7° for 6" fittings, 5° for 8" to 12" pipe, 3° for 14" to 24" fittings, and 2° for 30" to 48" fittings.

Flanged ends on fittings shall meet ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges. Fittings shall be cement lined in accordance with ANSI/AWWA C104/A21.4. Fittings shall be coated with an asphaltic seal coat inside and out in accordance with ANSI/AWWA C104/A21.4 and referenced in ANSI/AWWA C153/A21.53. Gaskets shall be styrene butadiene rubber (SBR) meeting ANSI/AWWA C111/A21.11. Fittings shall have t-bolts and nuts manufactured of low alloy steel meeting ANSI/AWWA C111/A21.11.

D. Mechanical Joint Restraint:

1. General: Mechanical joint restraints shall be manufactured of DI in accordance with ASTM A536 with the following additional requirements or exceptions. Mechanical joint restraints shall be incorporated into the design of a follower gland. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts in accordance with AWWA C111 and C153.

2. Design: The restraint mechanism shall consist of numerous individually activated gripping surfaces to maximize restraint capability. The gripping surfaces shall be wedges that are designed to spread the bearing surfaces on the pipe. Twist-off nuts, sized the same as tee-head bolts, shall be used to ensure the proper actuating of restraining devices. When the nut is sheared off, a standard hex nut shall remain.

3. Pressure Rating: The mechanical joint restraint device shall be as listed below:

Type of Pipe	Sizes (Inches)	PSI	Safety Factor
DI	3 to 16	350	2
	20 to 36	250	2
PVC	Various	Equal to that of the pipe being used	2

4. Acceptable Models and Manufacturers:

Mechanical Joint Restraint – PVC Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Megalug 2000 PV Series	4 to 20
Sigma Corporation	One-Lok SLCE Series	4 to 20
Star Pipe Products	StarGrip 4000 Series	4 to 20

Mechanical Joint Restraint – DI Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Megalug 1100 Series	3 to 24
Romac Industries	RomaGrip	3 to 24
Sigma Corporation	One-Lok SLDE Series	3 to 12
Star Pipe Products	StarGrip 3000 Series	3 to 24
Uni-Flange (Ford)	UFR 1400 Series	3 to 24

Bell-Spigot Restraint – PVC Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
EBAA Iron, Inc.	Series 1500 TD	4 to 12
	Series 1500	4 to 12
Ford Meter Box	Ford 1390	4 to 12
Star	Series 1100	4 to 12

Bell-Spigot Restraint – DI Pipe		
Manufacturers	**Models**	**Sizes (Inches)**
American	Fastgrip Gasket	4 to 16
EBAA Iron, Inc.	Megalug 1700 Series	3 to 20
	Series 1500 TD	4 to 12
Star Pipe Products	StarGrip 3100P Series	3 to 20
U.S. Pipe	Field Lok Gasket	4 to 16

Bolt-Through Mechanical Joint Restraint
Foster Adaptor

E. Gate Valves: Gates valves shall conform to the latest revision requirements of AWWA C-509 or C-515 for resilient-seated gate valves. Gate valves shall be of cast iron or ductile iron body construction, bronze mounted, solid wedge, resilient seal, with 2-inch square operating nut, 200 psi operating pressure or

higher, counterclockwise opening, inside screw, non-rising stems with O-ring seals. Gate valves shall maintain full nominal pipe diameter through the valve and have mechanical joint or flange fitting ends.

All valves shall be furnished with valve stems made from 300 or 400 series stainless steel. When a valve is required near a fitting, such as a tee, the valve shall be secured to the fitting. The Contractor shall provide to the Owner, at no additional cost, one gate valve wrench 6 foot long with "T" handle.

The name, monogram or initials of the manufacturer shall be legibly cast on the valve body. The make of valves furnished shall be easily identifiable by catalog numbers. All valves shall be equal to the Mueller A-2360 or American Flow Control Series 2500.

1. Lining: All interior ferrous surfaces exposed to fluid flow shall be epoxy coated to a minimum dry film thickness of 6 mils. Epoxy linings shall be factory applied by an electrostatic or thermosetting process in accordance with the manufacturer's printed instructions. The epoxy materials used shall be 100% powder epoxy or liquid epoxy that conforms to the requirements of AWWA C-550.

2. Coating: All exterior ferrous surfaces, except finished or bearing surfaces, shall be factory coated with two coats of asphaltic varnish conforming to Federal Specifications TT-V-51c, or shall be epoxy coated as required above for interior surfaces.

F. Gate Valve Boxes: All gate valves shall be provided with a $5^{1}/_{4}$-inch inner-diameter shaft, 2-piece sliding extension type cast iron valve box, Tyler Union 6855 Domestic Heavy Duty, or equal. All boxes shall extend from the body of the valve to the finished grade. The vertical column of the box shall be designed so that the top section may be adjusted while in position. The cast iron lid shall be 5-1/4" Domestic Heavy Duty Drop Lid with the word "SEWER" cast into it.

1. Extension stems: When the valve operating nut is more than four feet below the top of the valve box, stainless steel extension stems equal to TROY VALVE Stainless Steel Valve Extension Stems shall be provided. The top of the extension shall be 3 1/2 to 4 feet below the top of the valve box.

2. Debris Cap: Each valve box shall have a debris cap designed to prevent debris such as dirt and sand from passing around the cap and down into the valve housing and installed just below the valve cover. The cap shall be held in place by a mechanism which will not damage the valve housing. The cap must withstand, without slippage, a minimum vertical force of 50 pounds at a loading rate of 1 inch/minute. The debris cap and bottom of valve cover shall be separated by a minimum of 1 inch and not to exceed 2 inches. The cap shall be manufactured with corrosive-resistant material and fit the valve box's 5¼" diameter shaft. Caps shall be debris cap model number DC455 manufactured by SW Services, LLC or equal.

G. Sewer Force Main Cleanout: Sewer force main cleanouts shall be installed at the locations shown in the plans.

1. Piping and Fittings:

   a) Double main line (two-way) cleanout piping and fittings shall be 4-inch diameter as shown in the details. Cleanout construction material shall be as shown in the details. The cleanout piping and cap shall be threaded.

   b) Galvanized iron pipe, coupling and access cover shall conform to the requirements of ASTM A53 standard weight, schedule 40.

2. Concrete Pad and Concrete Collar:

   a) The double main line cleanout shall be supported by a concrete pad as shown in the detail drawing.

   b) The double main line cleanout shall be installed in a 60-inch x 24-inch x 4-inch reinforced concrete collar as shown in the detail drawing. The wire mesh used for the concrete collar shall be ASTM approved W 1.4 (1/8 inch) wire mesh.

c) A marker post and tracer wire access box shall be installed in the concrete collar as shown in the detail drawings.

d) All concrete for force main cleanouts shall have a 28 day compressive strength of 3,000 psi and be in accordance with Section 02 of these Technical Provisions.

e) Reinforcing steel shall conform to Section 03 of these Technical Provisions.

H. Wastewater Combination Air and Vacuum Valve and Vault: The combination air and vacuum valve shall be installed at the locations shown on the plans. The valve shall have a 2-inch N.P.T. inlet and outlet vent with a cast iron body and cover with stainless steel float. The valve shall be equal to CLA-VAL Series 36-WW22BW or Val-Matic 802ABW. Ball valves shall be brass, 1/2-inch, 1-inch, or 2-inch Watts or equal.

1. General:

a) The operating pressure of the valve shall be 0-150 psi with a venting capacity of 90 CFM.

b) The body and all operating parts shall be made of high strength corrosion-resistant materials.

c) The valve shall have the ability to automatically release small pockets of air during normal operation.

d) The valve shall have the ability to automatically discharge or admit large volumes of air during filling and draining.

e) Utility marker shall conform to Section 01 of the Technical Provisions.

f) Concrete shall conform to Section 02 of the Technical Provisions and reinforcing steel shall conform to Section 03 of the Technical Provisions.

2. ARV Vault:

a) Inside diameter of the vault shall be 48-inches.

b) Vault shall be composed of precast reinforced manhole barrel sections and shall have a 28-day compressive strength of at least 3,000 psi. Riser grade rings with tar sealer may be used.

c) Minimum height of sections shall be 24-inches. If two or more manhole sections are used to construct the vault, the joints between precast manhole sections shall be sealed with “Ram Nek” bituminous rope type sealer, or equal.

d) The sections shall be grouted to a smooth finish on the interior and exterior of the manhole.

e) All connections between pipe and manhole walls shall be sealed with non-shrinking grout.

f) Grout for jointing and connections shall be as specified in Section 02 of the Technical Provisions.

g) The depth of the vault from interior floor to the underside of the access hatch shall be a minimum of 42-inches but shall not exceed 48 inches.

3. Vault Concrete Collar and Vault Lid:

a) Concrete collar shall be reinforced with #4 steel hoops centered horizontally and vertically.

b) Vault lid (access hatch cover) shall be a Halliday Series R1R Model R1R48 or approved equal.

c) Opening of the lid shall be over the larger area of the vault as shown on the detail.

d) The frame edge for the vault shall be coated with bituminous coating where in contact with the concrete vault for proper sealing.

e) Four (4) stainless steel lag-bolts with a minimum bolt diameter of 3/8-inch shall be used to mount the frame to the inside wall of the vault. An appropriate concrete anchoring system such as expanding lead lag-shields shall be used. The bolts shall be installed in an equally spaced, four quadrant pattern as shown on the plans or directed by the Owner's Representative.

f) The underside of the lid shall be insulated in cold climates, as shown on the design plans or directed by the Owner or Owner's Representative. The insulation can be field installed or can be factory installed by the manufacturer. Field installed insulation shall be completed using 2-inch polystyrene insulation board with appropriate compatible adhesive or an approved securing mechanism, as directed by the Owner's Representative. Polystyrene insulation board shall be installed in accordance with TP 01.

I. Transition Manholes

1. Transition manhole type(s) and location(s) are shown on the drawings and shall transition the pressurized sewer flow from the sewer force main to gravity flow in a sewer gravity main.

2. Manhole materials including base, barrel, cone, frame, cover, steps, adjustment rings, coating, joints, and waterstops shall meet the requirements of Section 06 of these Technical Provisions.

3. Transition manholes shall be tested in accordance with TP 06.

J. Warning Tape and Tracer Wire: Warning Tape and Tracer Wire (including tracer wire access boxes and tracer wire splice kits) shall be in accordance with Section 01 of the Technical Provisions. Warning tape shall be GREEN in color with "CAUTION - BURIED SEWER LINE BELOW" continuously printed on it.

K. Markers and Bollards: Marker and bollards shall be installed in accordance with Section 01 of these Technical Provisions.

TP - 43.04 INSTALLATION OF PRESSURE SEWER LINES:

A. General: Trenching and backfilling operations shall be performed as specified in Section 01 of the Technical Provisions. Pipe and fittings shall be installed in accordance with the manufacturer's printed specifications and instructions, to the standards of AWWA for installing the type of pipe used, and in accordance with Sections TP-01 and TP-04. Each section of pipe shall rest upon undisturbed earth, or compacted bedding materials, with recesses excavated to accommodate joints.

B. PVC Pipe Laying: Unless otherwise indicated, there shall be a minimum of 3 feet of cover over the pipe. Pipe, fittings, and valves shall be carefully handled to avoid damage. As the work progresses, the interior of the pipe shall be cleared of all dirt and superfluous materials of every description. Trenches shall be kept free from water and the pipe shall not be laid when conditions of the trench or the weather are unsuitable for such work. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed with a water tight plug so that no trench water, rodents, earth, or other substances will enter the pipe.

Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflecting the joints. The amount of deflection at each pipe joint shall not exceed the manufacturer's printed recommended deflections. When rubber gasketed pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wider on curves for this purpose. Any pipe that has its grade or joint disturbed after laying shall be taken up and re-installed. The interior of all pipe shall be thoroughly cleansed of all foreign matter before being lowered into the trench and shall be kept clean during laying operations by use of plugs or other approved devices.

1. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe without additional expense to the Owner. The Contractor shall make every effort to backfill all excavation by the end of each workday.

2. When trench bottom is soft and, in the opinion of the Owner or Owner's Representative, cannot support the pipe, a further depth and/or width shall be excavated and refilled to grade with stabilization and bedding material as specified in Section 01 of these specifications.

3. All pipe shall be laid to the depth shown on the plans, or at such depths as may be established by the Owner or Owner's Representative in order to connect the new pipe to the existing sewer mains. Unless otherwise specified, the pipe shall be laid to a depth that will provide for a cover of at least 3 feet over the top of the pipe.

4. Joints with pipes of differing materials shall be made with appropriate adapters approved by the Owner or Owner's Representative, but in no case will threading of the PVC pipe wall be allowed.

5. Where required, PVC pipe shall be cut square using a powered cutoff saw, carpenter's fine tooth handsaw, or hacksaw. Once cut, the pipe shall be machine or hand beveled to give a one-half inch tapered end.

C. HDPE Pipe Installation: All HDPE used in constructing the sewer force main shall conform to Section 28 of these Technical Provisions.

D. Mechanical joint restraints shall be installed at all bends and tees. Pipe joints adjacent to restrained bends and fittings shall be restrained in accordance with manufacturer's recommendations based on soil conditions. Mechanical joint restraints shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly. Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts.

1. When thrust blocking is approved by the Owner or Owner's Representative, concrete blocking shall bear against solid undisturbed earth at the sides and bottom of the trench excavation and shall be shaped so as not to block weep holes or obstruct access to the joints of the pipe or fittings.

2. Polyethylene wrap shall be placed on fitting bolts to prevent hardening of concrete on connections. The concrete shall not cover nuts and bolts of joints or fittings. The concrete shall have minimum 28 day compression strength of 3,000 psi. Under no circumstances shall concrete thrust blocks be allowed on vertical bends in lieu of mechanical restrained joints.

E. Warning tape, tracer wire and tracer wire access boxes shall be installed according to Section 01 of the Technical Provisions.

TP - 43.05 WATER AND SEWER LINE SEPARATION REQUIREMENTS:

Water and sewer main separation shall be per Technical Provision 01.

TP - 43.06 CONNECTIONS TO TRANSITION MANHOLE:

A. General:

1. Connections to a new transition manhole shall be made as shown on the plans and in accordance with the detail drawing and TP 06, or as directed by the Owner or Owner's Representative.

2. Connection to an existing manhole, to be used as a transition manhole, shall be made in accordance with TP 06 along with any modifications shown in the detail drawing for the transition manhole.

B. Transition Manhole Base:

1. The base of the manhole shall slope up from the sewer force main connection to the gravity sewer main connection, as shown in the detail drawing.

2. Elevation of the gravity sewer invert shall be a minimum of 1-foot above the elevation of the force main crown.

3. Provide a smooth upward sloping channel on the manhole base from the force main to the gravity sewer.

C. Pipe to Manhole Connection:

1. Install sewer force main and sewer gravity main pipe to manhole using approved gasket per manufacturer's recommendations.
2. All connections between sewer pipe and manhole walls shall be made using approved water stops and be sealed with non-shrinking grout in such a manner to make the manholes water tight.
3. Manholes shall not be acceptable if any evidence of infiltration into them is found. The Contractor shall take whatever actions are necessary, at his expense, to ensure that the manholes are completely watertight.

TP - 43.07 CONNECTIONS TO EXISTING FORCE MAINS:

Connections to existing sewer force mains, including joints and mechanical joint restraints, shall be made in accordance with these specifications and with the manufacturer's recommendations, based on the type of existing pipe material being connected to. The joint shall be tested for water tightness in accordance with this specification. Connections to existing sewer gravity mains shall not be allowed.

TP - 43.08 SETTING GATE VALVES AND BOXES:

A. General:

1. Install valves at locations indicated on the plans.
2. All valves, including gate valves, air release valves, and blowoff assemblies, shall be set, jointed and restrained to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished.
3. Valve installation shall be as shown on the standard detail.
4. Before installing the valve assembly, care shall be taken to see that all foreign material and objects are removed from the interior of the valve.

B. Setting Valves and Valve Boxes:

1. Valves and valve boxes shall be set plumb and valve boxes shall be placed over the valve or valve operator in such a manner that the valve box does not transmit shock or stress to the valve.
2. Support gate valves on a 4-inch concrete block set on compacted base during assembly and fully restrain the valve to the water main piping.
3. Center the valve box over the valve nut.
4. Backfill shall be placed and compacted around the valve box. The valve box shall be maintained plumb and centered over the valve nut during backfilling and compaction.
5. The valve shall be opened and closed to verify that all moving parts are in working order.
6. The cast iron valve box cover shall be set flush with elevated concrete collar or flush with the road surface.
7. Install a debris cap in the valve box meeting the requirements of TP 04.03.F.3 and as shown in the detail drawing.

C. Concrete Collar:

1. After installing the gate valve box, the Contractor shall properly compact the area around the gate valve box prior to installing the concrete collar to ensure that there is no settlement.
2. A 32-inch diameter OR a 24-inch square by 4-inch thick reinforced concrete pad shall be poured around each valve box as shown on the plan and detail drawings or instructed by the Owner or Owner's Representative.
3. A tracer wire access box shall be set in the concrete collar and next to the valve box with the tracer wire routed and connected as shown in the detail drawing.
4. Before the concrete has set, the Contractor shall neatly scribe in the concrete pad the size of the valve, material of pipe and orientation of the pipe with two arrows.

D. Valve Markers:

1. For valves outside of the right of way, the Contractor shall install two offset permanent Metal Marker Posts for all sewer force main valves installed under this contract.
2. The marker posts shall be equidistant (4 feet typical) at a 45 degree angle from the valve to the sewer force main.
3. Set marker post with 36-inches of post above grade with label facing roadway and valve between roadway and post.
4. Stencil the size of the valve and the distance to the valve legibly on the aluminum cap. Dimensions and thickness shall meet requirements shown in applicable detail. Metal marker post shall meet the requirements of and be installed in accordance with Section 01 of these Technical Provisions.
5. For valves within the right of way, the Contractor shall install a Utility Line Marker to locate the valve. Utility line markers shall meet the requirements of and be installed in accordance with Section 01 of these Technical Provisions.

TP - 43.09 SEWER FORCE MAIN CLEANOUT INSTALLATION

A. Cleanout:

1. The cleanout shall be constructed at the locations shown on the plans and shall be constructed according to the detail drawing.
2. Fittings shall not be greater than 45 degrees (1/8 bend).
3. Cleanout shall allow for rodding/snaking the force main line in both directions.
4. Non-setting pipe thread sealant shall be used on the plug threads, such as Teflon T Plus 2 or equal.

B. Concrete Support Pad:

1. A concrete pad shall be poured to support the base of the ductile iron wyes of the cleanout, as shown in the detail drawing.
2. The concrete pad shall meet the dimensions of the pipe diameter (wide) x 18-inches (long) x 6-inches (thick).
3. Concrete shall not be in contact with the ductile iron flanges.

C. Concrete Collar:

1. The cleanout shall be extended so that the top face of the threaded plug is at the finished grade of the concrete collar.
2. The concrete collar shall be constructed around the cleanout at the ground surface per the detail after site grading is complete to match finished grade.

3. The concrete collar shall be reinforced with welded wire mesh with a minimum of ½-inch of concrete over the mesh.

TP - 43.10 WASTEWATER COMBINATION AIR/VACUUM VALVE AND MANHOLE INSTALLATION:

The wastewater air release valve shall be installed in accordance with the manufacturer's printed specifications and instructions. The air valve vault shall be installed in accordance with the applicable sections of TP-01

A. General:

1. The air release valve and vault shall meet the requirements of TP 43.03.G.
2. The air release valve shall be installed inside a manhole as indicated in the detail drawing and at the location shown on the plans.
3. Before installing the valve assembly, care shall be taken to see that all foreign material and objects are removed from the interior of the valve.
4. Utility marker shall be installed as shown on the detail drawing and in accordance with TP-01.

B. Setting Vault:

1. Manhole shall be installed at the location and elevation shown on the site plans or as directed by the Owner or his/her representative in the field.
2. Vault shall be set plumb and level on solid concrete masonry blocks and gravel base as shown on the detail drawings. The diameter of the gravel base shall be 6-feet minimum. Gravel shall be placed below the vault and in the vault to the depth shown in the detail drawings.
3. Manhole sections, and adjustment rings if required, shall be grouted in place when the manhole is constructed. The grout shall be spread evenly over the entire mating surface. The maximum number of adjustments rings shall be indicated on the plans. The jointing and sealing materials shall be approved by the Owner or Owner's Representative prior to installation.
4. Backfill shall be placed and compacted around the vault. The vault shall be maintained plumb during backfilling and compaction.
5. Penetrations in the vault walls shall be made as shown in the detail drawings. All vault penetrations shall be sealed with approved grout material.

C. Concrete Collar:

1. After installing the concrete vault, the Contractor shall compact the area around the vault prior to installing the concrete collar to ensure that there is no settlement.
2. A 12-inch wide by 6–inch thick (minimum) reinforced circular concrete pad shall be poured around the vault as shown on the plan and detail drawings or as instructed by the Owner or Owner's Representative.
3. The concrete collar shall have a minimum slope of 1/12 away from the vault.
4. The vault lid shall be securely bolted to the inside wall of the vault per the manufacturer's recommendations. The lid shall be oriented, bolted and sealed in accordance with TP 43.03.G.3. The lid shall be set 4-inches above finished grade with the concrete collar sloping as shown on the detail drawing. A pad lock shall be provided with the lid and keyed as requested by the operating utility.

D. Setting Valve and Piping:

1. The sewer force main shall tapped at the location shown on the plans or as indicated by the Owner or Owner's Representative.

2. The inlet line shall be connected to the sewer force main using a water tight connection as shown on the plans. The Contractor shall use the approved connecting fittings including tees, reducers, service saddles, corp stops and piping. Mechanical restraints shall be used as necessary to secure the connection.

3. Where the air release valve and vault are offset horizontally from the water main, the horizontal sections of piping shall have a minimum of 1% slope upwards to allow for the upward movement of air from the water main.

4. The size of the air release valve and fittings, as well as the inlet and outlet piping for the valve shall be as sized by the Owner's Representative and as indicated on the plans.

5. The location and configuration of the air release valve and fittings, as well as the inlet and outlet piping for the valve shall be as indicated on the detail drawings. The valve and riser piping assembly shall be located 12-inches to 18-inches from the vault wall.

6. The air relief line shall be a screened return bend. Screen shall be #12 mesh copper, bronze or brass. This air relief line shall be affixed to the inside vault wall with a 2-inch stainless steel strap.

7. A 4-inch diameter GI air vent shall be installed with #4 mesh stainless steel screen.

   The valve shall be fitted with blow off valves, quick disconnect couplings and minimum 5 feet of hose, to permit backflushing after installation without dismantling valve.

TP - 43.11 POLYETHYLENE WRAPPING:

Where called for in the plans and specifications or as directed by the Owner or Owner's Representative, pipe (ductile iron), valves, and fittings shall be encased in a polyethylene protective wrapping referred to hereafter as polywrap.

A. Materials: The polywrap shall be of virgin polyethylene, not less than 8 mils in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultra violet light will be less than 48 hours. Otherwise the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers. The polywrap shall be secured as specified below with 2 inches wide pressure sensitive plastic tape not less than 10 mils thick. Tape shall be Scotchrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex, or approved equal. The minimum tube sizes for each pipe diameters are indicated in the table below:

Polywrap Flat Tube Widths		
Nominal Pipe Diameter (inches)	Tube Widths with push-on joints (inches)	Tube Widths with mechanical joints (inches)
4	14	16
6	17	20
8	21	24
10	25	27
12	29	30

B. Installation: The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. With the pipe suspended from the center, the tube shall be slipped over the spigot end and bunched up between the point of support and the spigot end. After the pipe is installed into the bell of the adjacent pipe, the pipe shall be lowered to the trench bottom and the supporting sling removed from the center of the pipe. The pipe shall then be raised at the bell end enough to allow the tube to be slipped

along the full length of the barrel with enough left at each end to overlap the adjoining pipe about 1 foot. A shallow bell hole must be made at each joint to facilitate installation of the polywrap.

Pull the bunched-up polywrap from the preceding length of pipe, slip it over the end of the new length of pipe, and secure in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. Then slip the end of the polywrap from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe, and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe. Repair any rips, punctures or other damage to the tube with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

TP - 43.12 PIPE CLEANING:

At the conclusion of the work, thoroughly clean all of the new pipe lines to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period by forcing a cleaning swab through all mains 6-inch or greater. Flushing velocities shall be a minimum of 2.5 feet per second. All flushing shall be coordinated with the Owner or Owner's Representative. Debris cleaned from the lines shall be removed from the job site.

TP - 43.13 PVC PIPE PRESSURE TESTING:

This section only refers to PVC pipe pressure testing. HDPE pipe shall be pressure tested according to Technical Provision Section 28.

A. All pipe shall be tested for leaks. Use Pressure Test Form at the end of this section. Where any section of a force main is provided with concrete thrust blocking for fittings, the pressure tests shall not be made until at least 48 hours after installation of the concrete thrust blocking unless otherwise approved by the Owner or Owner's Representative.

B. Contractor shall provide all necessary equipment, including but not limited to, an appropriate pump, water container, water meter, pressure gauge, valve, and corporation stop connection, and shall perform all work required in connection with the tests. Contractor shall coordinate with Owner or Owner's Representative so they may witness the entire duration of each pressure test. Prior to requesting the Owner or Owner's Representative to witness the pressure test, the Contractor shall have all equipment set up completely ready for operation and shall have previously successfully performed the test to verify that the test section will pass. The Contractor shall notify the Owner or Owner's Representative a minimum of two working days in advance of the date that the Contractor plans to perform the pressure tests.

C. The test equipment shall be provided by the Contractor and is subject to inspection by the Owner or Owner's Representative. Arrangements for water used in pipeline testing and payment for the water shall be coordinated with the operating utility. Pressure gauges used in testing shall be graduated at a maximum in 5 psi increments. Two gauges will be used simultaneously for verification of the gauges' functionality. Prior to the test, the pipeline will be pressured to 10 psi above the test pressure, and then the pressure will be decreased to the test pressure so that gauge responsiveness can be observed. Each section tested shall be slowly filled with water, with care being taken to expel all air from the mains and service lines, if installed. If necessary, the pipes shall be tapped at high points to vent the air. All pipelines shall be tested for water tightness up to the individual building service meter.

D. The test pressure shall be 150 psi (measured at the lowest point of elevation in the test section). No section shall be tested that is greater than 2,500 feet in length or that has greater than 25 psi pressure change due to elevation. In no case shall the test pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints. The test shall be conducted in such a manner that existing lines and service user's plumbing is not damaged. Damage caused by testing shall be corrected at the expense of

the Contractor. All connections shall be tested with the main as far as is practicable. Air testing shall not be allowed.

1. The test section shall be slowly filled with water and all air shall be vented from the line. The test shall not begin until the pipe has been filled with water for at least 24 hours to allow for absorption. The test shall have a minimum duration of two hours with the two hour period beginning when the test pressure is attained and the pump ceases operation.
2. Any time the test pressure drops 5 psi, the pressure shall be restored to full test pressure and the quantity of water used shall be recorded. The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter with a sweep unit hand registering 1 gallon per revolution. At the conclusion of the test period, the Contractor shall pump the test section to full test pressure and record the total water used during the test.
3. The Contractor shall keep a record of all pressure tests. Minimum information recorded at the time of the test shall include the contract number, Contractor name, date, time, stationing or other description of the test section, length and diameter of the test section, total allowable leakage, leakage detected, pass or fail indication and printed name of recorder. Copies of field pressure tests records shall be submitted to the Owner to show compliance with these requirements before payment is requested.
4. Allowable maximum leakage is 0.04 gallons per inch diameter per 24 hours per coupling. Visible leakage will not be allowed. All leaks shall be repaired and additional tests conducted until leakages are less than the allowable maximum. All repairs shall be made in a manner approved by the Owner and shall be at the expense of the Contractor.

TP - 43.14 MEASUREMENT AND PAYMENT:

A. Force Main: Sewer pipe shall be measured in linear feet along the centerline of the pipe, including fittings, for each of the various sizes of sewer pipe installed. Payment for sewer pipe shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, bedding, stabilization material, pipe installation, fittings, thrust block/mechanical joint restraints, warning tape, tracer wire and box, hydrostatic testing, trench backfilling, compaction, final grading, as-built drawings, and final cleanup.

B. Gate Valves: Gate valves shall be measured each for the various sizes of gate valves installed. Payment for gate valves shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, related valves boxes, materials, and incidentals required for a complete installation, including excavation, gate valves, gate valve boxes, mechanical joint restraints, concrete blocks, reinforced concrete collar, tracer wire and box, marker posts, backfilling, compaction, record drawings, and final cleanup.

C. Sewer Force Main Cleanout: Sewer force main cleanout shall be measured each. Payment shall be at the contract unit price shown in the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, material and incidentals required for a complete installation, including but not limited to excavation, concrete pad, fittings, concrete collar, tracer wire access box, marker post, backfilling, record drawings and final cleanup.

D. Wastewater Combination Air Release and Vacuum Valve and Vault: Each air release valve and vault shall be measured as one unit price item. Payment for the combination air release and vacuum valve, cover and vault shall be at the contract unit price shown on the Bid Schedule. This shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including excavation, connection to sewer force main, connection fittings, piping, combination air and vacuum valve, ball valve, pipe support, screened gooseneck, seepage gravel, concrete

vault, reinforced concrete collar, frame and cover, utility marker, compaction, backfilling, record drawings, and final cleanup.

E. Connection to Transition Manhole: Connection of sewer force main to transition manhole shall be paid at the lump sum unit price indicated on the Bid Schedule for each type of connection described. Payment shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, material, and incidentals required for a complete installation, including but not limited to excavation, cutting into the existing manhole, water stop gasket, grouting, fittings, removing the existing invert, pouring and forming a new invert, backfilling, record drawings, and final cleanup.

F. Connection to Existing Force Mains: Connection of new sewer force main to existing force mains shall be paid at the lump sum unit price indicated on the Bid Schedule for each type of connection described. Such payment shall be full compensation for all labor, equipment and materials necessary to complete the connection including service interruption, cutting of existing force main, provision and installation of fittings, mechanical joint restraints, and resumption of service.

PVC PRESSURE TEST FORM: METHOD AND RECORD

(PVC Pressure Pipes)

Project: _____ Owner: _____

Location: _____ Date: _____

Project #: _____

Contractor: _____

Inspector: _____

Tester: _____

Test Section Area: _____

Test Section Location: From Station: _____ To Station: _____

(I) CALCULATE ALLOWABLE LEAKAGE (for 2 hour test at 150 psi for PVC):

$$L = \frac{N \times D}{300}$$

L = Allowable leakage: _____ gallons

D = Diameter of pipe: _____ inches

N = Number of joints in test section: _____

(II) CONDUCT AIR VOLUME TEST:

1. Pressurize line to 150 psi
2. Remove volume of water equal to amount of allowable leakage
3. Recheck pressure to assure a significant change (10 psi min.) from 150 psi.

(III) CONDUCT PRESSURE TEST:

1. Re-pressurize line to 150 psi
2. Add water as necessary to maintain pressure between 140 and 150 psi for test period (2 hours)
3. Upon completion of test period add water to increase the pressure back to 150 psi
4. Measure total volume of water added in steps 2 & 3. ***If the volume of water added exceeds allowable leakage, the test failed.***

Time	Air Volume Test			Pressure Test			Pass Y/N	Owner Witness Signature
	Initial Pressure (psi)	H_2O removed (gal)	Final Pressure (psi)	Initial Pressure (psi)	Final Pressure (psi)	Total H_2O Added (gal)		
	step 2.1	step 2.2	step 2.3	step 3.3	step 3.3	steps 3.2–3.4		

REMARKS:

"I CERTIFY THE ABOVE REFERENCED SECTION OF SEWER MAIN HAS BEEN PRESSURE TESTED AND PASSED IN ACCORDANCE WITH THE PROVISIONS OF THIS SPECIFICATION."

_____

Contractor's Representative Date

_____

Owner's Representative or Inspector Date

SUBMITTAL REVIEW FORM, SECTION 43 – SEWER FORCEMAIN

	Date	Initials		
Received by ENGINEER:			Submittal No.	
Received by OWNER:			Project No.	
			Contract No.	

TP	Specification	Description (Indicate Type, Model No., Manufacturer, etc.)	Action By Owner
43.03B1	PVC Pipe		
43.03B2	DI Pipe		
43.03C	DI Fittings (Bends, Tees)		
43.03D	Pipe Restraint		
43.03E	Gate Valve		
43.03F	Gate Valve Box, Lid		
43.03.F1 & 43.03.F2	Extension Stem & Debris Cap		
43.03.G	Cleanout Piping, Fittings, & Wire Mesh,		
43.03H	Combination Air Release Valve Assembly		
43.03H2 & 43.03.H3	ARV Vault, Cover, Fittings, Valves & Piping		
43.11	Polywrap		
43.13	Pressure Testing Method & Equipment		
43.13	Pressure Test Results		

43.06	Connection Method to Transition Manhole		
43.07	Connection Method to Existing Force Main		

	Signature	Date
CONTRACTOR:		
OWNER APPROVAL:		

TECHNICAL PROVISIONS

SECTION 60 - CHAIN LINK FENCING

TP - 60.01 SCOPE:

The work covered under this section consists of furnishing all equipment, labor, materials, and incidentals necessary for the complete installation of a chain link fence and accessories, in strict accordance with the applicable drawings, the provisions of ASTM F567 (active standard), and these Technical Provisions.

TP - 60.02 GENERAL:

The fence shall be constructed in the locations as shown on the drawings, or as directed by the Owner or Owner's representative.

TP - 60.03 MATERIALS:

A. Fence Fabric: Fence Fabric shall be zinc coated steel fabric meeting the requirements of Federal Specifications RR-F-191/1C and ASTM A392. Fabric shall be woven in a 2-inch diamond mesh and of height specified on the drawings. The weight of zinc coating shall not be less than 1.2 oz/ft^2.

1. Wire used in four-foot (4') fence fabric shall be 11-gauge (0.120 inch diameter) and shall be knuckled on the top and bottom selvage.
2. Wire used in six-foot and eight-foot (6', 8') fence fabric shall be 9-gauge (0.148 inch diameter) and shall be twisted on the top selvage and knuckled on the bottom selvage. Wire ends shall be cut at an angle.

B. Tension Wire: Tension wire shall have a marcelled pattern. The wire shall be zinc-coated, galvanized steel wire, 7 gage (0.177 inches in diameter), conforming to ASTM A824.

C. Barbed Wire: Barbed wire shall be zinc-coated steel barbed wire conforming to ASTM A121. The barbed wire shall be design number 12-4-5-14R: two twisted strands of 12-gauge wire, and 4-point, 14-gauge barbs spaced 5 inches on center.

D. Chain Link Fence Accessories: The following components shall be zinc-coated steel with a minimum zinc coating of 1.2 oz/ft^2, and galvanized after fabrication, conforming to ASTM F626. Any additional fence accessory not specifically stated shall also meet these requirements unless otherwise approved by the Owner or the Owner's representative.

1. Post and line caps: Caps shall be designed to fit securely over the outside of the posts and be watertight.
2. Rail and brace ends: No additional requirements.
3. Tie wires, clips, and fasteners: No additional requirements. Hog rings shall be included in this category.
4. Tension and brace bands: No additional requirements.
5. Tension bars: Tension bars shall have a cross section no less than 3/16-inch by 3/4-inch. The tension bar shall be of a continuous length and not shorter than 2 inches less than the nominal height of the fabric.
6. Truss rod assembly: The truss rod assembly shall consist of a steel rod not less than 3/8" in diameter and be equipped with a turnbuckle or other equivalent provision for adjustment. The assembly shall be capable of withstanding a tension of 2,000 lbs.
7. Barbed wire arms: Barbed wire arms shall be designed to fit securely over the outside of the post while supporting horizontal braces and be watertight. Arms shall be at an angle of 45-degrees and

shall be fitted with clips for attaching three strands of barbed wire. Barbed wire arms shall be of sufficient strength to withstand a weight of 250-lbs applied at the outer strand of the barbed wire.

E. Posts, Post Rails and Braces: All pipe required for construction of the fence and gates shall be round Schedule 40 steel pipe, hot-dip galvanized (interior and exterior), zinc-coated, regular grade (30,000 psi) meeting or exceeding the requirements of ASTM F1083 and ASTM F1043 Group 1A. Pipe sizes for fence components are presented in the following table.

Use	Nominal Pipe Size	Outside Diameter (in.)	Weight (lbs/ft)	Fence Industry Trade Reference
Line Post				
1. 4' Fence	1 ½"	1.900	2.72	1 7/8"
2. 6' and 8' Fence	2"	2.375	3.65	2 3/8"
Brace rail, Intermediate Rail	1 ¼"	1.660	2.27	1 5/8"
Gate Frames				
1. 4' Fence	1 ¼"	1.660	2.27	1 5/8"
2. 6' and 8' Fence	1 ½"	1.900	2.72	1 7/8"
Terminal, End, Corner & Slope/Pull Posts				
1. 4' Fence	2"	2.375	3.65	2 3/8"
2. 6' and 8' Fence	2 ½"	2.875	5.80	2 7/8"
Gate Posts				
1. 4' Fence				
Gate leaf up to 4-feet	2"	2.375	3.65	2 3/8"
Gate leaf over 4' to 10'	2 ½"	2.875	5.80	2 7/8"
Gate leaf over 10' to 18'	3 ½"	4.000	9.11	4"
2. 6' and 8' Fence				
Gate leaf up to 6-feet	2 ½"	2.875	5.80	2 7/8"
Gate leaf over 6' to 12'	3 ½"	4.000	9.11	4"
Gate post sizes for gate leaf widths greater than listed shall be as directed by the Owner.				

F. Gates and Accessories: Swing gates, complete with latches, stops, keepers, hinges, drop bar, and barbed wire, shall be provided where shown on the plans. Swing gates shall conform to ASTM F900.

1. Gate Frames: Gate Frames shall be Schedule 40 steel pipe as described in 60.03 B of this specification.
2. Gate Fabric: The fabric shall be as specified for the fence as described in 60.03A of this specification.
3. All gate accessories shall be zinc-coated with a minimum zinc coating of 1.2 oz/ft^2, galvanized after fabrication, conforming to ASTM F626 and in accordance with tests set forth in ASTM A90.
4. Hinges: Gate Hinges shall be pressed steel or malleable iron. The hinges shall be designed to permit the gate to swing a full 180 degrees. The hinges shall be of adequate strength, with large bearing surfaces for clamping in position and shall not twist or turn under the action of the gate.
5. Latches: Double gate latches shall be a plunger bar arranged to engage the gate stop. Locking devices shall be constructed so that the plunger bar cannot be raised when the gate is locked. The latching device shall have provision for a padlock and shall be designed such that both gate leaves can be locked with a single padlock. Single gate latches may be of the same style, or a forked latch may be provided. Each latch shall be provided with a padlock, Master or equal, and four keys.

6. Gate Stops: Gate stops shall be provided for all double gates and shall consist of a galvanized, hot-dipped zinc-coated Schedule 40 drop-bar and a receiving gate stop as illustrated on standard details of the construction drawings.

7. Keepers: Keepers shall be provided for each gate leaf 5 feet in width or more. Gate keepers shall consist of a mechanical device for securing the free end of the gate when in the full open position.

G. Concrete: Concrete shall be in conformance with Section 02 of the Technical Provisions.

H. Warning Signs: Warning signs shall be prepared and erected to display the information/text/message as shown in the drawings. The size of the warning signs, number of warning signs, and the location of the warning signs shall be manufactured as shown on the construction drawings.

The signs shall be constructed of sixteen (16)-gauge zinc coated steel or 0.105 inch aluminum sheeting. The letters shall be black on white background of a size approved by the Owner or Owner's Representative. The white background shall be hot sprayed with a weather resistant, flexible enamel for enduring appearance. The letters shall be silk screened with sharp clear lines painted with a weather resistant flexible enamel.

The signs shall be the product of a company regularly engaged in the manufacture of metal signs.

TP - 60.04 INSTALLATION:

The fence shall be installed in accordance with ASTM F567 except as modified in these specifications.

A. Preparation: Prior to commencing all work, the Contractor shall locate all underground utilities and structures. The Contractor shall indicate the location and slope of fence lines, gates and terminal posts for actual construction by staking and shall secure the Owner's approval that such layout is in accordance with the plans. The Contractor shall clear and grade along the fence line only as necessary to provide a uniform clearance between the fence fabric and ground and permit proper installation. The Contractor shall remove existing fence at the work site as directed by the Owner or as indicated on the plans. All ground disturbances shall be filled to match existing grades.

B. Post Location: Line posts shall be spaced equidistantly at intervals not exceeding 10 feet. Terminal posts (end, corner, gate and slope/pull posts) shall be set where an abrupt change in alignment or grade of 30-degrees or more occurs or to divide straight runs of fencing which exceed 500-feet in length.

C. Post Setting: Set posts in concrete in holes of diameter and depth as shown in the tables below. Posts shall be set in a vertical position, plumb, in line and centered in the footing. Concrete shall be placed 6" below the post and shall extend 2 inches above grade and be crowned to shed water. Forms are not required. Fence fabric shall not be stretched until the concrete has cured for at least 7-days. If solid rock or concrete is encountered, the posts shall be set as recommended by the fencing manufacturer and approved by the Owner or Owner's Representative prior to installation.

1. Four-Foot (4') Fence Post Holes:

4' FENCE POST HOLES			
Type of Post	**Diameter of Post Hole**	**Depth of Post Hole**	**Depth of post in Concrete**
Line Posts *(1.900" OD)*	8"	24"	18"
Terminal Posts *(2.375" OD)*	10"	24"	18"
Gate Posts			
1. Gate leaf less than 4' *(2.375" OD)*	10"	36"	30"
2. Gate leaf between 4' to 10' *(2.875" OD)*	12"	36"	30"
3. Gate leaf over 10' to 18' *(4.000" OD)*	16"	36"	30"
Post holes for gate leafs greater than listed shall be as directed by the Owner.			

2. Six-Foot (6') and Eight-Foot (8') Fence Post Holes:

6' and 8' FENCE POST HOLES			
Type of Post	**Diameter of Post Hole**	**Depth of Post Hole**	**Depth of post in Concrete**
Line Posts *(2.375" OD)*	10"	30"	24"
Terminal Posts *(2.875" OD)*	12"	30"	24"
Gate Posts			
1. Gate leaf less than 6' *(2.875" OD)*	12"	36"	30"
2. Gate leaf over 6' to 12' *(4.000" OD)*	16"	36"	30"
Post holes for gate leafs greater than listed shall be as directed by the Owner.			

D. Post Caps: All posts shall be fitted with watertight caps. Barbed wire arms shall be installed on line posts to perform this function.

E. Top Rail and Bottom Tension Wire: The top rail shall be supported at each post so that a continuous brace from end-to-end of each stretch of fencing is formed. The top rail shall be securely fastened to the terminal posts and joined with sleeves or couplings. Bottom Tension wires are required and shall be fastened within the bottom three-inches (3") of the fence fabric. The tension wire shall be securely fastened to all terminal, gate and corner posts. Securely fasten the tension wire to the terminal, corner and gate posts with a brace or stretcher bar band. The tension wire shall be taut and free of sag. After the fabric is stretched, fabric shall be attached to the bottom tension wire with C-rings (Hog-rings) at intervals not exceeding 12-inches. Fence fabric shall be secured to the top rails with tie wire at intervals not exceeding 18-inches.

F. Bracing: Bracing shall be provided for each terminal, corner and gate post consisting of a brace rail and truss rod assembly. Corner posts shall have bracing assemblies installed in both directions to the next line post. The brace rail shall be installed between the terminal, corner or gate post and the adjacent line post at 2/3 height of the fabric. The truss rod assembly shall be installed from the bottom of the terminal, corner or gate post to the brace rail. The truss rod assembly shall be as shown on the plans and shall be finished neatly without undue protrusion of the ends.

G. Tension Bars: Tension bars shall be threaded through the fabric and attached to the terminal, corner or gate post by brace bands or tension bands at intervals not exceeding 12-inches. Terminal and gate posts shall have one (1) tension bar installed. Corner posts shall have two (2) tension bars installed.

H. Fence Fabric:

1. Install fence fabric on the outside of the fence and gate assembly framework.

2. Position the fence fabric two-inches (2") above ground level. Fasten the fabric to terminal, corner and gate posts with tension bars as specified. Cut the fabric and fasten each span independently at all terminal, corner and gate posts. Secure and apply sufficient tension to remove all slack and provide a smooth uniform appearance before making other attachments. Attach the fence fabric to the bottom tension wires with C-rings (hog rings) at intervals not exceeding 18" and to line posts with tie wires at intervals not exceeding 12".

3. The fence fabric shall be cut by untwisting a picket and attaching each span independently to the terminal post as described. Where the fabric must be spliced, weave a single picket through the end links to form a continuous mesh and form the appropriate selvage at each end.

I. Barbed Wire: Where barbed wire is required, barbed wire shall be stretched taut to remove all sag and installed in the slots of the extension arms. Attach each strand of barbed wire to the terminal post using a brace band.

J. Summary of Fence Fabric Attachment points:

Fence Fabric Attachment to:	Attach with:	Attachment Spacing:
Terminal Post Line Post Corner Post Gate Frame Horizontal member Gate Frame Vertical member	Brace Bands & Tension Bar Tie wire Brace Bands & Tension Bar Tie wire Brace Bands & Tension Bar	12”
Tension Wire	Hog ring	18”

K. Gates: Swing gates complete with latches, stops, keepers, hinges and barbed wire shall be provided where shown on the plans. Swing gates shall conform to ASTM F900 except as otherwise specified.

1. Frames shall be made of pipe as specified in 60.03B.
2. Frames shall be made with corner fittings or welding. Protect welds by applying a zinc-rich paint in accordance with ASTM A780 and the American Galvanizer Association such as Galvax Cold Galvanizing Paint (95% Zinc) or an approved equal. Where corner fittings are used, gates shall have truss rod assemblies even if not otherwise stated. Gate leaf design shall be as stated below. Interior bracing shall be evenly spaced within the frame. Gate leaf sizes that are not encompassed by the following requirements shall be as noted on the plans or as directed by the Owner.
   a. 4’ fabric gate leaf of 3’ – 4’ width shall have one diagonal truss rod assembly.
   b. 6’ – 8’ fabric gate leaf of 3’ - 4’ width shall have one horizontal brace.
   c. 6’ – 8’ fabric gate leaf between 5’ to 8’ width shall have one horizontal brace, one vertical brace and one diagonal truss rod assembly.
3. Where barbed wire is required, the end members of the gate frames shall extend one foot above the top horizontal member to which three strands of barbed wire, uniformly spaced, shall be attached by use of bands or clips.
4. Fabric shall be attached securely to the gate frame by tension bars, brace bands, and tie wires as specified for fence construction. All fence fabric attachments to gate framing is spaced a maximum of 12”.
5. Hinge and latch offset opening space from the gate frame to the gate post shall be no greater than 3” in the closed position.
6. Gate stops for double gates shall be set in a concrete footing of minimum 12” diameter and 24” deep.
7. The gate shall be capable of being opened and closed easily by one person and installed in a manner as to prevent removal of the gate by lifting off.
8. Gates shall swing or slide in the direction indicated in the drawings. Grade clearance and all possible gate obstructions shall be considered to provide adequate operational clearance. Gates shall be true to opening and plumb in a closed position.

L. Repairs to Coatings: Where galvanized coatings are cut, broken, burned, abraded, or otherwise damaged, affected areas shall be repaired by applying zinc-rich paint in accordance with ASTM Practice A780.

TP - 60.05 GRAVEL COVER:

Gravel cover shall be installed at the locations indicated on the plans. The designated areas within the fence shall be graded, sterilized, and covered with plastic sheeting and gravel. The Contractor shall excavate the designated areas within the fence to a depth of 3 inches below the final grade and shall shape and smooth the excavated area to correct any surface irregularities. If directed by the Owner or Owner’s representative, the area shall then be

sprayed with an approved soil sterilant, equal to Primatol, to prohibit vegetation growth. The designated soil sterilant shall be applied at a rate that is in accordance with the manufacturer's recommendations. Soil sterilant shall not be applied around well-heads/water source sites. If specified by the construction drawings, the treated ground surface shall be completely covered with one layer of woven, needle punched, 5.0 ounce polypropylene landscape fabric/weed-barrier designed for professional and commercial use equal to Dewitt Pro-5 Weed Barrier. All weed-barrier fabric joints shall overlap a minimum of 12 inches.

After placement of the landscape fabric/weed-barrier sheet-stock, the entire area shall be covered with a 3 inch uniform layer of washed gravel. Care will be taken in placing the gravel to assure the landscape fabric/weed-barrier is not displaced, punctured or torn. The gravel shall be 3/4-inch to 1-1/2 inch in size and shall be subject to the Owner's approval.

TP - 60.06 CLEANUP:

The area of the fence installation shall be left neat and free of any debris caused by the erection of the fence.

TP - 60.07 MEASUREMENT AND PAYMENT:

A. Mobilization/Demobilization: When applicable, and if separate from the inclusions of TP-01, payment for mobilization/demobilization shall be at the lump sum listed in the bid schedule. Mobilization shall consist of moving all necessary materials and equipment to the site to perform the work. Demobilization includes repacking and removal of all tools, equipment and construction debris from the work area to the satisfaction of the Owner. 60% of this line item may be requested upon complete mobilization to the job site and the remainder may be requested upon demobilization from the job site.

B. Removal of Existing Fence: Payment for the removal of existing fence shall be measured in linear feet of fence removed; this price being full compensation for all labor, equipment,and incidentals required to remove and dispose of the existing fence per federal, state and local regulations.

C. Fencing: The fencing shall be measured in linear feet along the fence line, including the gates. Payment for fencing shall be at the contract unit price shown in the Bid Schedule; this price being full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation, including posts, rails, fabric, barbed wire, gates, signage, associated fence accessories and clean up.

D. Gravel Cover: Payment for gravel cover shall be made per cubic yard basis for furnishing all labor, equipment, materials and incidentals for placing the gravel. Such payment shall include, but not be limited to, furnishing materials, soil preparation, placement of landscape fabric/weed-barrier, labor, equipment, miscellaneous material, and clean-up.

SUBMITTAL REVIEW FORM

SECTION 60 - CHAIN LINK FENCING

	DATE	INITIALS	Submittal No.	
Received by ENGINEER:			Project No.	
Received by OWNER:			Contract No.	

TP	Specification	Description (Indicate Type, Model No. Manufacturer, etc.)	Action by Owner
60.03	4’ Fence Fabric		
60.03	6’ – 8’ Fence Fabric		
60.03	Posts and Rails		
60.03	Tension Wire		
60.03	Barbed Wire		
60.03	Post & Line Caps		
60.03	Rail & Brace Ends		
60.03	Tie Wire and Hog Rings		
60.03	Brace Bands and Tension Bands		
60.03	Truss Rod Assembly		
60.03	Barbed Wire Arms		
60.03	Gate Hinges		
60.03	Gate Latch		
60.03	Gate Stop		
60.03	Gate Keeper		
60.03	Warning Signs		
60.04	Zinc-rich paint		
60.05	Gravel		
60.05	Landscape fabric/weed-barrier		
60.05	Soil sterilant		
02	Concrete Mix		

	Signature	Date:
CONTRACTOR:		
OWNER APPROVAL:		

EXHIBIT B

INDIAN OWNED ECONOMIC ENTERPRISE QUALIFICATION STATEMENT

The Undersigned certifies under oath the truth and correctness of all responses set out below as follows:

1. Name of Enterprise: _____

   Address: _____

   Telephone #: _____

2. Check one:

   _____ Corporation
   _____ Partnership
   _____ Sole Proprietorship
   _____ Joint Venture
   _____ Other:

3. Answer the following:

   A. If a Corporation:

      i. Date of incorporation: _____

      ii. State of incorporation: _____

      iii. Name & address of statutory agent: _____

      _____

      _____

      iv. Give the name and address of the officers and members of the Board of Directors of this Corporation and establish whether they are Indian (I) or Non-Indian (NI). Proof of Tribal Membership in a federally recognized Indian Tribe is required for all responses.

Name and Social Security No.	I or NI	Title	Address	% of Stock Ownership
		President		
		Vice-President		
		Sec/Clerk		
		Treasurer		

v. Complete the following information on all stockholders who are not listed above, owning 5% or more of the stock. Establish whether they are Indian (I) or Non-Indian (NI).

Name and Social Security No.	I or NI	Address	% of Stock Ownership

B. If a Sole Proprietorship or Partnership:

i. Date of Organization: _____

ii. Give the following information on the individual or partners and establish whether they are Indian (I) or Non-Indian (NI).

Name and Social Security No.	I or NI	Address	% of Stock Ownership

C. If a Joint Venture:

i. Date of Joint Venture Agreement: _____

ii. Attach the information for each member of the joint venture prepared in the appropriate format given above.

4. Give the name, address, and telephone number of the principle spokesperson of your organization:

_____

_____

5. Has this enterprise been certified as an Indian Owned Economic Enterprise by any government or Tribal agency to qualify for special consideration under Indian preference contract clauses, or been awarded contracts by any government or Tribal agency based on Indian preference consideration?

Yes _____ No _____

A. If yes, complete:

Contract Date	Contracting Agency	Contract No.	Location of Work

6. Will any officer or partner listed in #3 be engaged in outside employment?

Yes _____ No _____

A. If yes, complete:

Name	Outside Employment	Hours/Week

7. Does this enterprise have any subsidiaries or affiliates or is it a subsidiary or affiliate of another concern?

Yes _____ No _____

A. If yes, complete:

Name and address of subsidiary affiliate or other concern	Description of Relationship

8. Does this enterprise or any person listed in #3 above have or intended to enter into any type of agreement with any other concern or person which relates to or affects the on-going administration, management or operations of this enterprise? These include but are not limited to management, and joint venture agreements and any arrangement or contract involving the provision of such compensated services as administrative assistance, data processing, management consulting of all types, marketing, purchasing, production and other type of compensated assistance.

Yes _____ No _____

A. If yes, attach a copy of any written agreement or an explanation of any oral or intended agreement.

9. Attach certification by a Tribe or other evidence of enrollment in a federally recognized Tribe for each officer, partner or individual designated as an Indian in #3.

10. Attach a certified copy of the charter, articles of incorporation, by-laws, partnership agreement, joint venture agreement and/or other pertinent organizational documentation.

11. Explain in narrative form the stock ownership, structure, management, control, financing, and salary or profit sharing arrangements of the enterprise, if not covered in answers to specific questions heretofore. Attach copies of all shareholder agreements, including voting trust, employment contracts, agreements between owners and enterprise. Include information on salaries, fees, profit sharing, material purchases, and equipment lease or purchase agreements. Evidence relating to structure, management, control, and financing should be specifically included. Also, list the specific management responsibilities of each principal, sole proprietor, partner, or party to a joint venture (as appropriate) listed in response to #3.

NOTE:

- ✧ Omission of any information may be cause for rejection of claim for Indian Preference.
- ✧ The persons signing below certify that all information in this INDIAN OWNED ECONOMIC ENTERPRISE QUALIFICATION STATEMENT, including exhibits and attachments, is true and correct.
- ✧ Print and type name below all signatures.

If applicant is Sole Proprietor, Sign Below:

_____ _____

Name Date

If applicant is in a Partnership or Joint Venture, all Partners must sign below:

_____ _____

Name Date

_____ _____

Name Date

If applicant is a Corporation, affix corporate seal:

_____ _____

Corporate Seal Date

By: _____

President's Signature

Attested by: _____

Corporate Secretary's Signature

WARNING:

U.S. Criminal Code, Section 1010, Title 18, U.S.C. provides in part: "Whoever...makes, passes, utters, or publishes any statement, knowing the same to be false...shall be fined not more than $5000 or imprisoned not more than two years, or both."

EXHIBIT C

SECTION 00 MODIFIED TECHNICAL PROVISIONS

SECTION 42 SEWAGE LIFT STATION

A. Technical Provision Section 42 (TP-42.02 MATERIALS, SECTION A, #4.j)

Add after bullet point iv:

v. Contractor shall furnish the anti-floatation flange and the reinforced concrete column according to the construction drawings.

B. Technical Provision Section 42 (TP-42.02 MATERIALS, SECTION A, #6.g)

Remove the entire paragraph and replace it with:
Trash Basket: A trash basket is not required for this project.

C. Technical Provision Section 42 (TP-42.02 MATERIALS, SECTION E)

Add the following after section 7:

8. Cleanout: Contractor shall install a 3" cleanout assembly, including a 4" x 4" x 3" flanged wye, a 3" gate valve, and a 3" stainless steel camlock to the discharge pipe plumbing tree according to the construction drawing. Contractor shall submit shop drawings to the Owner for review and approval prior to installation.

D. Technical Provision Section 42 (TP-42.04 ELECTRICAL SYSTEM, SECTION C, #3)

Add the following after section 3.

Contractor may reuse the existing power pole adjacent to the existing lift station site shown on the construction drawing if approved by the local power utility. Contractor shall coordinate all required work with the local power utility prior to the commencement of work.

E. Technical Provision Section 42 (TP-42.04 ELECTRICAL SYSTEM)

Add the following after section GG.

HH. Backup Generator: Contractor shall provide and install a 30kW diesel generator mounted on a concrete pad according to the construction drawing.

II. Equipment Rack: Contractor shall mount panels on an equipment rack with a roof.

The equipment rack size, location, and concrete pad shall be installed according to the construction drawing.

JJ. Electrical Design: Electrical design for the lift station site has been provided as part of the construction drawing. Contractor shall provide and install all items indicated on the electrical design drawings.

KK. SCADA: Contractor shall install a cellular SCADA monitoring system for remote control and monitoring. The SCADA monitoring system shall be Omnisite Crystal Ball or approved equal. A 2-year warranty and subscription service plan shall be provided. Contractor shall submit shop drawings to the Owner for review and approval, prior to installation.

LL. Pump Control Panel Wiring: The electrical instrumentation (EI) drawings are provided for reference only. Contractor shall provide the control panel schedule and wiring diagrams and submit shop drawings to the Owner for review and approval prior to installation.

F. Technical Provision Section 42 (TP-42.05 PUMP CONTROL SYSTEM, SECTION A, #1)

Change:
The Contractor shall furnish and install a float-style level control system. The control system shall consist of four floats, 2 basic relays, and a relay with an alarm.

To:
The Contractor shall furnish and install a pressure transducer level control system with floats as backup. The pressure transducer shall be Flygt or approved equal. Both the pressure transducer and floats shall consist of four level settings, 2 basic relays, and a relay with an alarm.

G. Technical Provision Section 42 (TP-42.12 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT A and B)

Remove entire paragraph and replace with:

A Lift Station: Payment is for the lump sum bid price for a complete wastewater lift station including labor, equipment, delivery, testing, site access, clearing, excavation, backfilling and compaction, dewatering, piping, wet well, wet well liner, wet well lid and access cover, confined space entry sign, installation of the drain line from air release valve to wetwell, lift station accessories, davit crane, force main piping, valves, flow meter, cleanout, submersible pump(s), as-builts, operation and maintenance manuals, training, abandonment of existing lift station, associated existing control panel and gravity mains, delivery of items removed or abandoned to the Owner, and site cleanup and all necessary appurtenances for a complete and operational installation. Payment shall also include any of the following optional items required by the plans: mix-flush system, confined space entry blower, and four-gas detector.

B. Lift Station Electrical: Payment is for the lump sum bid price for a complete wastewater lift station electrical system including labor, equipment, delivery, testing, design, installation and as-builts, control panel, SCADA monitoring unit, 30kW generator, automatic transfer switch, wet well level control, junction box, electrical work, electrical service connection, disconnect switch, mini power-zone panel and transformer, control panel structure, electrical equipment rack with roof, enclosures, outlets, wiring and conduit from control panel to wet well for pump power and level control cables, all associated power utility costs, wiring diagrams, coordination of electrical service installation with PNM, and all necessary appurtenances for a complete and operational installation.